A Database Publication

THE MICRO USER

Number 4
Volume 6
June 1988
£1.50

Top-selling guide to the BBC Micro, Master, Archimedes and Z88

3D SURFACES
Draw shapes with depth and shadow

BEASTIROIDS
A superb version of a classic game

MUSIC 2000
Add Midi power to your BBC Micro

Z88
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ONLINE
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- Tape inlay printer
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REVIEWS
- MER and SideWise
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... plus all the latest games

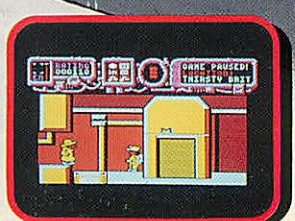
SPYCAT

An Interactive Exposé of M.I.4½

The London Skyline Viewed from Blackhall

Outside No. 10 Drowning Street

Meeting the P.M.



Waiting to see "M"

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Spycat is a skilfully-written arcade adventure game which takes place amongst the corridors of power in Blackhall, Drowning Street and the M.I.4½ underground surveillance complex.

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Spycat is a thoroughly captivating game. To complete the adventure, you will need to use clear logical thought as well as fast reactions and arcade skills. Your life as an undercover cat may not be easy but it will always be exciting!

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PLUS watch your own heartbeats displayed, measure your manual dexterity and hear your own voice backwards – all courtesy of a BBC Micro.

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The Micro User welcomes program listings and articles for publication. Material should be typed or computer-printed, and preferably double-spaced. Program listings should be accompanied by cassette tape or disc. Please enclose a stamped, self-addressed envelope, otherwise the return of material cannot be guaranteed. Contributions accepted for publication will be on an all-rights basis.

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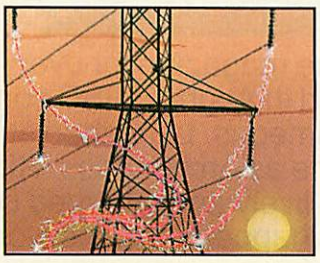

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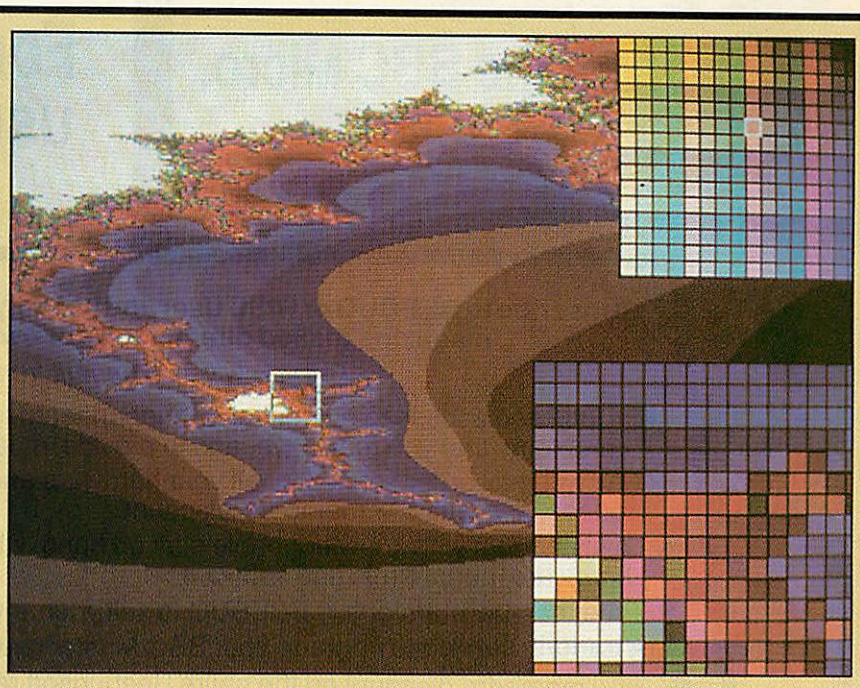


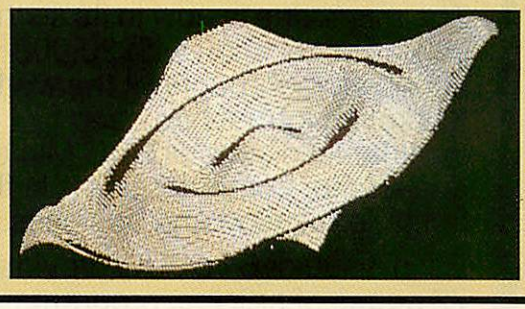
ARCHIMEDES PIXEL EDITOR

The software provided with Acorn's new Risc-based micro lacks the facility to change very fine detail on the full graphics screen. But it CAN be done, and on this month's 3.5in disc we present a handy mouse-driven routine which lets you do it. Using it you can touch up your displays in any mode to obtain superb pictures. The final results can be perfect right down to the last tiny detail. Find out all about it on Page 50.

It's so easy to produce

3D SURFACES

with the listing on Page 89. And there's a special Archimedes version on this month's 3.5in disc.



ELECTRON & BBC MICRO USER SHOW

You'll find the very latest software and peripherals for the complete Acorn range at the next Electron & BBC Micro User Show. There's so much to enjoy as Acorn in Action demonstrates some of the truly amazing projects powered by Acorn machines. Turn to Page 3 for full details of how to save money on your tickets to the greatest show yet.

MICRO USER CLASSIFIEDS

The best bargains in the world of the BBC Micro come from fellow readers of *The Micro User*. Turn to **Page 124** to find just what you're looking for – from cheap modems to complete computer systems.

Get it right!

All major listings in this issue are accompanied by a checksum to help overcome any typing mistakes. For full details of how they work, see the article on Page 28 of the February issue of *The Micro User*.

NEXT MONTH

GAME
Play electronic Halma
UTILITY
Autosave your programs
ARCHIMEDES
Linking to a BBC Micro
REVIEW
Conquest: Better art

THE MICRO USER

July 1988 issue on sale June 1

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For users of the BBC Micro, Master and Compact

RISC USER

For Archimedes users

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- An Acorn appointed specialist support and service centre.

BEEBUG

The magazine is now in its sixth year of publication with 20,000 subscribers throughout the world. Its proven format has been invaluable to serious BBC Micro and Master computer users in the home, education and business.

Each issue of BEEBUG provides 72 pages of articles, programs (utilities, applications etc), tutorials, workshops, reviews, hints & tips, news and information for beginners and experts alike. All our programs are tested on all versions of the BBC Micro, and are also available monthly on disc or tape.

RISC USER

This is the magazine for everyone interested in Acorn's RISC computer, the Archimedes. Launched at the same time as Archimedes, RISC User provides lively and informed coverage of what's happening in the world of Archimedes.

Reviews, hints, programs and articles are all specifically written for Archimedes, showing how to exploit the many features of this sophisticated computer. RISC User is all about the Archimedes; it does not contain modified programs originally intended for the Model B or Master.

BEEBUG and RISC User are both published 10 times a year and are only available on subscription, not through the shops.

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MU6

NEWS beat

FUTURE LOOKS GOOD, SAYS ACORN BOSS

ALTHOUGH it lost £3.3 million last year and suffered a £10 million drop in sales, Acorn Computers is facing the future with confidence.

The custom systems division – which accounted for two-thirds of the deficit – has since been closed and overheads considerably reduced as a result.

One-off launch costs of the Archimedes also contributed to the loss, while the machine's booming sales did not figure in the 1987 balance sheet.

Acorn chairman Bruno Soggiu said that despite "the disappointment of having to report a loss", the year embraced "notable successes which augur well for the future".

"The Archimedes – based on Acorn's own design 32 bit Risc chip set – was launched to widespread technical acclaim. Risc architecture is now seen by many companies as the ideal route to high performance at economical cost", he said.

"Volume shipments of the Archimedes only started in the last quarter of 1987 and didn't make a major contribution to revenues, although start-up and launch costs of some magnitude did".

Elserino Piol, executive vice-president of Acorn's majority shareholder Olivetti, said: "The development of Risc-based products is opening up new worldwide market opportunities, reinforcing Acorn's strategic role as an autonomous member within the Olivetti group.

Acorn managing director Harvey Coleman is encouraged by the increasing availability of native Archimedes applications in addition to the thousands of BBC Micro and MSdos packages that can be used in emulation mode.

"Our investment in advanced research and development benefits us as a manufacturer, but we can exploit this investment more widely", he said.

"Significant interest is being shown by major companies in the technology behind the Risc processors and systems designed by Acorn"

Facing the future confidently . . . Harvey Coleman (left) and Bruno Soggiu

It's not all Greek to you

THE Minerva competition in the February issue revealed that readers of *The Micro User* are exceptionally well-read in Greek mythology.

So many got the correct answers that tie-breakers decided the destinations of the prizes – a selection of business packages from Minerva.

First prize of System Delta Plus and a five-module accounting package was won by P. Khorassandjian of Sheffield. J. G. Butler of Kilbrachan won the second prize of System Delta Plus and Minotaur. Third, fourth and fifth prize winners, who each receive a copy of Delta Base and Minotaur, are K. Hammant, Andover; R. Maguire, Norwich; and T. Cooke from Doncaster.

A monster line in spreadsheets

THE world's biggest spreadsheet – enough paper to encircle 3,000 people – will go on display at the Electron & BBC Micro User Show to be held at the Royal Horticultural Hall, Westminster, London, May 13 to 15.

The 220ft-long printout is made possible by Minerva Systems' new SigmaSheet spreadsheet which is being launched at the show.

It can produce 1,000 rows by 16,000 columns, and – running on the Archimedes – can calculate a 32-year cash flow in under 25 seconds, making it the fastest, as well as the largest, spreadsheet in the world.

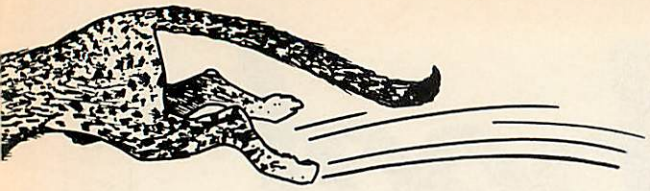
The package is capable of producing a cash flow analysis for up to 333 years and is 16,000 times faster than ViewSheet and 200 times faster than Inter-Sheet and Logistix, according to Minerva Systems. It costs £69.95.

As well as launching SigmaSheet, Minerva Systems will be previewing Gamma Plot for the Archimedes. The usual plot and chart functions are complemented by an art package which allows the user to incorporate drawings with graphs. Price £69.95.

The event has attracted lots of other exciting new hardware and software products.

Beebug is celebrating its

Turn to Page 9 ▶



DID YOU SEE THAT?

NO

Well, you probably won't see SigmaSheet calculate either!

It's the **FASTEST** spreadsheet in the world.

It's the **LARGEST** spreadsheet in the world.

It's as **POWERFUL** as the most famous spreadsheet in the world (Lotus 123™), yet it's only one-sixth of the cost!

SIGMASHEET

AFFORDABLE Σ EXCELLENCE

EXAMPLE COMPARISONS

	ViewSheet	Intersheet	Logistix	SigmaSheet
Time to calculate SIN(PI) A1 to Z50 (1300 cells)	48.00	6.49	5.84	0.03
Memory free with above sheet (A310)	9272	12600 (estimated)	153000	533916
Speed factor of SigmaSheet above others	1600	216.3	194.6	

Note: SigmaSheet calculates a spreadsheet of cashflow A1 to AL219 (year 1988 to 2020) in less than 25 seconds. No other spreadsheet can handle a cashflow this size, yet SigmaSheet still has 298,952 bytes free!

Lotus 123 is a trade mark of Lotus

SIGMASHEET

SOFTWARE FOR THE ARCHIMEDES

£69.95 incl. VAT

MINERVA

SOFTWARE

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NEWS beat

Show stopper

◀ From Page 7

seventh anniversary by launching a Wimp-based communications package that supports viewdata, VT52, VT102, Tektronix emulation and Kermit file transfer. Price £59. It is also releasing a fully buffered 5.25in disc interface, price £18, and demonstrating an internal modem for the Archimedes.

Games specialist Tynesoft will be launching its latest multi-level arcade war simulation for the BBC Micro – Saigon. An enhanced commando game, it features 80 screens which you have to battle across to release prisoners of war.

Dataphone will have its new range of BT approved modems – Demon II and Designer – on display. They feature auto dial/answer, auto baud rate, V21, V23 and full anti-tinkle circuitry.

Both modems are offered at special show prices of £79.95 for the Demon II and £99.95 for the Designer.

Demonstrating the Archimedes version of its Pixel Perfect DTP software will be AVP Computing. "The program was great on the BBC Micro, but on the Archimedes it is truly fantastic", said Lawrence Nauen, AVP's general manager.

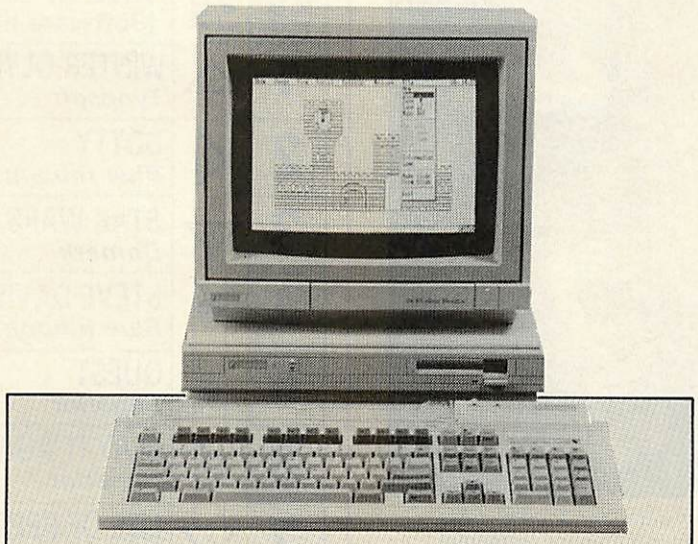
BRIGHTER PRINTING

A NEW printer rom for users of Mini Office II will be available at the show from Dabs Press (061-773 2413).

MiniDriver allows a range of type styles to be selected from within the word processing section of Mini Office II.

Over 70 print types including condensed and enlarged are available by keying in a simple two letter embedded command.

Prices have yet to be finalised, but the company hopes to sell Minidriver for approximately £15.



Archimedes' big education role

APPLICATIONS software for the Archimedes now stands at over 200 packages, many of them educational.

A spokesman for Acorn said: "The list is growing rapidly. Critics who claimed that software would be slow to arrive have been well and truly proved wrong".

The software base has been further increased with the announcement of a CAD package from Autodesk.

Acorn (0223 215431) claims that AutoSketch is a precision drawing package that offers an introduction to desktop CAD. Developed and ported to the Archimedes by Autodesk, the package is the latest in a range of professional design and productivity tools for Acorn's Risc-based technology.

By using the mouse and a series of pull-down menus, lines, arcs, circles and curves of different colours can be created. And line types can be drawn and assigned to any of 10 drawing layers.

The system requirements are an Archimedes with at least 1Mb of ram.

Price £79.

BBC show for Sydney

OUR neighbours Down Under are to have their first-ever Acorn and BBC Micro show. Organised by Ozbeeb, the Australian BBC Micro user group, the event is to take place at the Museum of Fire in Sydney.

"The show is aimed at demonstrating the benefits of the BBC Micro in education, business, technology, games and music", said Phil Gothard of Ozbeeb.

Business advice service is on line

MICROLINK, the UK's most innovative computer communications system, has joined forces with the University College of Swansea in a unique instant electronic information service for businesses.

With the new service – called ExpertLink – subscribers can get free advice from experts in various fields, and discuss business problems with others who may have experienced similar difficulties.

As well as being instant and free, this access to professional expertise comes with no strings attached, no axe to grind and no commercial bias.

The team at Swansea University that is answering the queries includes three professors, several PhDs and experts in a large number of fields including management science, ergonomics, overseas trade, electrical and mechanical engineering, foreign languages, psychology and sociology.

The wide range of business sectors covered includes legal matters, exporting, industrial relations, management skills, market research, personnel and training, statistical and systems analysis.

Expertise is also supplied in the areas of computing and computer systems.

All messages are read by system operators who pass them on to the relevant expert.

If a query is commercially sensitive or otherwise private, users can leave a message for the system operator.

A tip in a million . . .

WHO wants to be a millionaire? That was the theme of a talk given by Watford Electronic's MD, Nazir Jessa at the recent Electron & BBC Micro User Show in Manchester.

His lighthearted talk came to the conclusion that a combination of luck, honesty, hard work and determination were the basic ingredients of success.

"The will to succeed is very important, and if you have the right product at the right time then you just can't go wrong", he said.

NEWS beat

The "inscrutable" Mandarin Software team opted for Oriental dress when the new label was officially launched in a Chinese restaurant

A sort of software takeaway

ADVENTURE games fans are going to hit the jackpot as a result of a new joint adventure agreement.

Mandarin Software, the exclusive new entertainments software house, has joined forces with the renowned Level 9 programming team to service the BBC Micro market.

And the end product is the release of an 80-track version of the acclaimed Time & Magik adventure trilogy for the Master, Master Compact and BBC Micros fitted with sideways ram boards.

Featuring mixed screen mode graphics with four colour scenes scrolling vertically over 80 column text, Time & Magik encompasses three award winning titles from Level 9 – Lords of Time, Red Moon and Price of Magik. Price £14.95.

Also coming soon under the Mandarin label from Level 9 will be a game set in the Middle Ages – codenamed Lancelot – which is reported to be a new concept in adventures.

The news of both titles was announced at the official launch of Mandarin Software held recently in London.

"With Level 9 arguably the world's leading adventure games company, the BBC market has a treat in store", said Chris Payne of Mandarin.

Serial saga ends

AT long last Acorn appears to have found a software solution for the communications problems that have dogged the Archimedes serial port since its introduction.

A patch – release 1.24 – is now available free of charge from its customer services department upon receipt of a disc.

The software solution allows users with modems to communicate at speeds up to 9600 baud as well as the usual split rate of 1200/75. Michael Page, Acorn's corporate communications manager said: "Not everyone has had problems, but the few that have we believe we have catered for with the new patch".

Third-party developers have already produced comms software for the machine.

Dataphone has announced Deputy, which it claims will permit users with compatible modems to access MicroLink, Telecom Gold, Prestel and similar systems supporting viewdata.

THE GALLUP CHART TOP 20 BBC SOFTWARE

THIS MONTH	LAST MONTH	TITLE (Software house)	TAPE PRICE
1	3	WINTER OLYMPIAD 88 *Tynesoft*	9.95
2	2	DOTTY *Blue Ribbon*	1.99
3	1	STAR WARS *Domark*	9.95
4	•	STEVE DAVIS SNOOKER *Blue Ribbon*	1.99
5	•	QUEST *Superior*	9.95
6	6	PLAY IT AGAIN SAM *Superior*	9.95
7	5	LIFE OF REPTON *Superior*	6.95
8	•	PLAY IT AGAIN SAM 2 *Superior*	9.95
9	12	SPITFIRE 40 *Mirrorsoft*	9.95
10	11	PALACE OF MAGIC *Superior*	9.95
11	4	LEAGUE CHALLENGE *Atlantis*	2.99
12	10	GRAND PRIX CONSTRUCTION SET *Superior*	9.95
13	7	COMPUTER HITS 10 VOLUME 4 *Beau Jolly*	9.95
14	9	BONECRUNCHER *Superior*	9.95
15	17	IMPACT *Audiogenic*	9.95
16	•	TETRIS *Mirrorsoft*	9.99
17	16	PLAN B2 *Bug Byte*	1.99
18	•	KOURTYARD *Go Dax*	9.95
19	•	COLOSSUS 4 CHESS *CDS*	9.95
20	•	KNIGHT LORE *Mastertronic*	1.99

Compiled by Gallup/Microscope

Seven new games make their entrance into the chart: You can read the reviews of Tetris and Play it Again Sam 2 in this issue of *The Micro User*. Winter Olympiad 88 takes first place from Star Wars while the re-released Steve Davis Snooker enters at No 4.

ARCHIMEDES & BBC SOFTWARE

INTER-CHART

A general purpose chart and graph plotting program that can display data in the most easily understood format—graphically.

While it integrates directly with other members of the 'INTER' family it can also accept data from ASCII files, produced by WORDWISE, VIEW and programming languages such as BASIC.

Supports line, and bar graphs, pie charts and also scatter graphs. These may be automatically scaling, or the user may view any portion of the scale so allowing 'zooming' into any area of interest.

Pie charts may have highlighted segments (pulled out) with the values optionally displayed as percentages.

All graph displays may have optional text headings or messages positioned anywhere on screen. These are saved with the graph and may be edited at any time.

Multiple graphs can be held in memory at the same time. Any number of graphs may be overlaid allowing easy comparisons etc. (Not applicable to pie charts.)

Graphs may be displayed in any BBC graphics mode. The colours of bars, lines, or segments may be altered from a simple table of colours. In addition special striped colour combinations and a variety of cross hatching styles are available for bar charts.

Where appropriate either axis may be displayed with a log or linear scale, and optional dotted graduation lines are available.

INTER-CHART has built in screen dump routines for EPSON matrix printers and compatibles. Other screen dump routines may be used from within (or external to) INTER-CHART for other printers or plotters.

BBC ROM—£32.00+VAT (£36.80 incl.)
Archimedes ROM £25+VAT (£28.75 incl.)

INTER-WORD

The ultimate word processor for the BBC Micro.

The most comprehensive WYSIWYG image of the final page showing at all times, page breaks, headings, footings, bold text, underlines etc, ensuring the page on screen looks as close as possible to the final printout.

Works in 40, 53, 80 or a special 106 column screen mode and offers super-fast scrolling in all modes, even sideways scrolling if necessary.

All margin and tab settings are controlled by rulers placed in the text. These may be altered by moving the cursor onto the ruler and simply dragging the required margin or tab to the new position. All text controlled by the ruler is instantly re-formatted to the new settings.

Pull down menus may control nearly all operations—no complicated commands to remember. This ensures that it really is easy to use.

Printer control menu allows easy access to all printers' special effects and allows easy configuring to any printer. Printer codes may be saved and re-loaded—no need for special printer drivers.

A special multi-file mode enables very long documents to be generated, even to the size of a disc, yet enables simple movement to any page in the document.

File selector for all file operations. This enables fast and very simple file name selection when saving, loading etc.

Integrates directly with other members of the INTER family and with SPELLMASTER, the fastest and most flexible spelling checker available for the BBC.

BBC ROM £49+VAT (£56.35 incl.)
Archimedes ROM £39+VAT (£44.85 incl.)

INTER-SHEET

A simple to use, but very powerful spreadsheet program offering many unique features.

The fastest spreadsheet available for the BBC Micro.

The largest capacity spreadsheet. This means more data and larger spreadsheets are possible.

40, 80 and a special 106 column screen mode. Especially useful for viewing large sheets.

Multiple spreadsheets in memory at once. Data from one may be included in the calculations of other sheets.

Super-fast replication allows anything from a single box to an area of the sheet to be copied to any other position. Formulae may be automatically updated relative to their new positions.

Simple WORDWISE like cursor movement.

A unique windowing system enables any row or column to be fixed on screen, while allowing the sheet to scroll underneath. Simpler than other windowing systems yet more flexible.

While it integrates directly with INTER-WORD it can also transfer data to and from other word processors such as VIEW and WORDWISE.

A large range of standard maths functions is included in addition to special spreadsheet functions such as AVERAGE, COUNT, IF . . ., LOOKUP, MAX, MIN, SUM etc.

Simple auto-prompting commands structure..If you can't remember the complete command syntax, just enter the first letter and INTER-SHEET will prompt from then on.

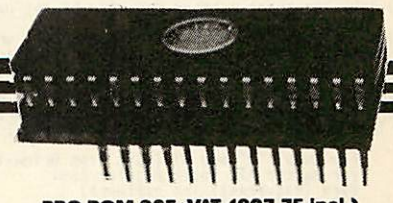
BBC ROM (2 chips) £49+VAT (£56.35 incl.)
Archimedes ROM £39+VAT (£44.85 incl.)

All the above ROMs are fully compatible with DFS, ADFS, Econet, all BBC machine variants and Watford or Aries shadow RAM boards.

MEGA 3

MEGA 3— the single chip solution

A new single 1 megabit chip containing complete versions of all the above programs is now available. This replaces 4 chips and so offers a more compact and more economic way of obtaining the above three programs.



BBC ROM £85+VAT (£97.75 incl.)
Archimedes ROM not yet available.

ACCESS & BARCLAYCARD ACCEPTED

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Hemel Hempstead
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Telephone 0442 63933

PINEAPPLE SOFTWARE

Programs for the BBC model B, B+, Master and Master Compact with disc drive

DIAGRAM II now also available for ARCHIMEDES

Diagram II represents a major breakthrough in the techniques used for drawing software on the BBC micro. It works on a completely different principle to other drawing software by storing the drawing information straight to disc as coded 8*8 pixel blocks.

This technique has three major advantages. First, the size of the diagram is only limited by the amount of space on disc. Second, there is no limit to the amount of information which can be stored on a given diagram as the information is stored on disc and not in computer memory. Third, the disc storage technique allows the smooth scrolling of the screen over the whole surface of the diagram.

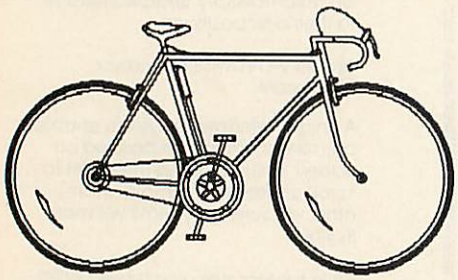
For people not familiar with Diagram, the basic operation of the program is to first display any part of the diagram, either by quoting an index name or screen number. At this point you are free to scroll the diagram around the screen using either cursor keys, trackerball or mouse. You may stop scrolling at any point and enter the edit mode which allows you to modify or add new information to the diagram. When you have finished making alterations, the new information is stored to disc and you are free to scroll elsewhere on the diagram stopping to edit at any time.

The edit features are now very comprehensive. Text may be typed straight from the keyboard, and if other fonts are stored as user defined characters then these fonts may be printed using the normal keyboard keys.

The print routines are now completely 'scaleable' with both the horizontal and vertical scales being totally variable in 1% steps between a size that will give 18 mode 0 screens on an A4 sheet and a size that would print just one pixel on a sheet! The routines are adaptable to most types of dot matrix printer and full advantage may be made of wide carriage printers. The printouts may be rotated through 90 deg. if required.

The new editing features make DIAGRAM II suitable for all types of serious drawing application including scale drawings, flow charts, architectural, family trees, and many other subjects as well as circuit and schematic diagrams. As an example of what Diagram II can do, this complete advertisement (with the exception of the PCB drawing) has been produced with the package.

1. Works on any model BBC computer with either DFS or ADFS.(ADFS only if Shadow memory available).
2. Will automatically take advantage of shadow memory (any make) to provide more User Definable Characters, 880 with Shadow, 381 without Shadow.
3. Rapid horizontal and vertical line drawing routine with automatic joins for circuit diagrams.
4. Full rubber band line drawing and circle drawing modes.
5. Takes advantage of the Acorn GXR rom to provide drawing of arcs, sectors, chords, parallelograms, ellipses, and flood filling. Note this rom is already fitted to Master and Compact machines.
6. Pixel cursor drawing and deleting mode allows very fine detail to be added.
7. Defined areas of screen may be moved, copied, deleted or saved to disc.
8. On-screen indication of cursor position shows either the cursor position on the overall diagram or the distance from a preset point.
9. Keyboard keys may be predefined to print User Defined Characters, enabling new character sets to be stored as user defined characters and then printed straight to the screen using the keyboard keys.
10. Wordprocessor files may be loaded to the screen and automatically formatted into any shape screen area.
11. Index names may be set up to point to given areas of a large diagram, to enable rapid access to a given point on a diagram.
12. Fully compatible with Marconi trackerball and most makes of mouse.
13. All Diagram 'Utilities' are included, enabling screen ident numbers and borders to be added, and any area of diagram to be moved or copied. The whole diagram may be displayed in reduced scale (either 4*4 or 8*8 format) on a single screen, and the size of the overall diagram may be increased or decreased.
14. Completely scaleable print routines allow any area of the diagram to be printed either horizontally or through 90 deg. in scales that may be varied in 1% steps allowing up to 18 mode 0 screens to be printed on an A4 sheet (still with readable text).
15. Complete with 40 page easy to understand handbook.



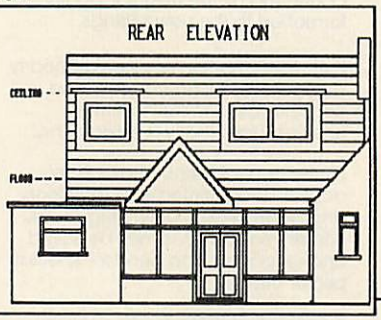


Diagram II consists of a set of disc files and a 16k Eprom. The disc supplied is formatted in 40T on side 0 and 80T on side 2. Please state if this is unsuitable for your system, or if you require a 3.5" Master Compact disc.
ARCHIMEDES version on 800k 3.5" disc.

DIAGRAM II — £55.00 + vat

P & P free (except overseas)

N.B. Upgrades are available to existing Diagram owners. Please contact Pineapple if you have not received an upgrade letter.

PCB

Pineapple's now famous printed circuit board drafting aid produces complex double sided PCB's very rapidly using any model BBC micro and any FX compatible dot-matrix printer.

The program is supplied on Eprom and up to 500 component and 500 ASCII component descriptions may be stored for each PCB. There is no limit to the number of tracks that may be stored for a given PCB although the maximum board size is restricted to 8" * 5.6".

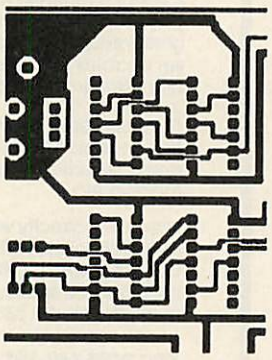
Using a mode 1 screen, tracks on the top side of the board are shown in red, while those on the underside are blue. Each side of the board may be shown individually or superimposed. A component placement screen allows component outlines to be drawn for silk screen purposes and component numbers and outlines entered on this screen may be displayed during track routing to aid identification of roundels.

The print routines allow separate printouts of each side of the PCB in a very accurate expanded definition 1:1 or 2:1 scale enabling direct contact printing to be used on resist covered copper clad board. The print routines are very fast taking typically 5 minutes for a 1:1 print of a 7" * 5" board.

This program has too many superb features to describe adequately here, so please write or 'phone for more information and sample printouts.

PRICE £85.00 + VAT

Plotter Driver to suit most plotters £35.00 + vat



PCB AUTO-ROUTING

This brand new addition to the PCB program greatly increases the power of the software and speeds the design of PCB's even more.

A connection list of up to 190 connections may be entered in the form of a 'rats nest' and then the computer does the rest!

You may specify which side of a board you wish the track to be on or leave the choice to the computer, and you may also say whether tracks should be allowed to pass between I.C. pins. Tracks may still be drawn manually at any time so boards may be produced by a combination of manual and auto techniques if required.

The program is in the form of a second Eprom and all the features are available even with an unexpanded model 'B' computer.

Please write or 'phone for full details.

COMPLETE AUTOROUTE PACKAGE (including manual eprom) £185.00 + VAT

MARCONI TRACKERBALL

This high quality device comes in three versions. Version one is for the standard BBC micro and comes with the Icon Artmaster drawing package from Micro-Draw, and Trackerball Utilities which allow the trackerball to be used with other software.

Version two is for the Master 128 computer and this comes with the Pointer Rom. This is a Rom which allows the Master to be configured for use with the Trackerball and has commands to enable the Trackerball to intercept the cursor key or joystick routines of other software. Commands are also available to reverse the axes of the trackerball and set the sensitivity. The three buttons may also be set up to produce any ASCII code.

Version three is simply the bare Trackerball which comes without software but is suitable for use with specially written software such as Diagram or Diagram II.

Trackerball adapters are also available which plug onto the end of the cable and convert the connections of the trackerball to be the same as a mouse. This enables the trackerball to drive all types of 'mouse' software.

For Model 'B' and B+ (with Icon Artmaster)	**£ 60.00 + vat**
For Master 128 (with Pointer Rom)	**£ 60.00 + vat**
Bare Trackerball (no software)	**£ 49.00 + vat**
Pointer Rom - available separately	**£ 12.50 + vat**
Trackerball to mouse adapters	**£ 8.00 + vat**
Postage & packing on Trackerballs	**£ 1.75**

MITEYSPICE

Miteyspice is a very powerful AC & DC circuit analysis package with graphics suitable for use with any model BBC micro including those with 2nd processors.

As well as all the usual facilities available with this type of program, non-linear effects, small signal, noise measurements and sweeps may be performed. Component values may be swept, allowing component tolerances to be investigated as well as thermal performance etc. Comprehensive transistor modelling is incorporated using a 20 parameter Ebers Moll description. The program is supplied on disc with a very comprehensive 49 page manual.

PRICE £119.00 + vat

ADFS Utilities Rom — ADU

ADU is an invaluable utility for all ADFS users. It adds over 22 new *commands to the ADFS filing system as well as providing an extensive Menu facility with over 35 sub commands covering areas such as repeated disc compaction, saving and loading Rom images, auto booting of files and many more.

Copying of DFS discs onto ADFS discs can be made in one pass with automatic creation of the required directories on the ADFS disc. All functions are fully compatible with Winchester drives including *BACKUP which allows backing up of Winchesters onto multiple floppies.

Additional *commands include:- *ADU, *BACKUP, *CATALL, *CHANGE, *DFSDFS, *DIRALL, *DIRCOPY, *DIRDESTROY, *DIRRENAME, *DISCEDIT, *DRIVE, *FILEFIND, *FORMAT, *KILLADU, *LOCK, *MENU, *PURGE, *PWRBRK, *UNLOCK, *VERIFY, *VFORMAT, *WIPE

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Access

NEWS beat

Showing the flag

ONCE again the faithful and ever growing army of users turned out in their thousands for the Electron & BBC Micro User Show in Manchester. On the first day a queue started before the doors opened.

There was lively trading too at the MicroLink stand, where two low-cost modems had their first public appearance.

Business was brisk at the Watford stand throughout the show, with a lot of interest being shown in the newly released digitiser specifically for the Archimedes machine.

One visitor in particular found something that took her fancy. 20-year-old Louise Goodall, who suffers from spina bifida, found she had power at her fingertips when she got to grips with Hybrid Technology's Music 5000 system.

For the more adventurous Ann "Ice Elf" Baslington and Andy "Elven Warrior" Penney were on hand to introduce the world of fantasy. Both are keen members of Spirit of Adventure, an organisation which takes fantasy seriously.

More are meeting their Master

DEMAND for the BBC Master computer is running at such strong level that Acorn Computers has placed further orders with AB Electronics to build up to 40,000 extra machines.

Terry Shurwood, Acorn's general manager, told *The Micro User*: "At the moment every machine built is being sent out to customers as soon as it arrives in our warehouse.

"Our forward order book for the rest of the year looks very good and we want to make sure that we are in a position to meet our customers' requirements".

Part of the success of the Master series is said by Acorn to be because it formed a complementary range with the Archimedes computer.

"What our customers want is longevity of product line with the assurance that what they buy today will work with future products we produce", said Shurwood.

Education's accolade

WATFORD Electronics' popular disc drives, the CLS 400S and the CS 400S, have received the official thumbs up from the Training and Educational Systems Testing Bureau.

The single 5.25in units contain 40/80 track switchable double sided mechanisms made by Mitsubishi and JVC of Japan.

Although over 25,000 of the drives have already been sold to schools, the recommendation by the bureau for their use in education is regarded by Watford Electronics (0923 37774) as the ultimate accolade.

CJE micro's

THE ACORN SPECIALISTS

The widest range of Archimedes Hardware & Software anywhere!

ARCHIMEDES

External Drive Interface

Fully buffered with link options. THE BEST. £30.00. N.B. not all drives are Archimedes compatible

Drive Swap Switch

For above makes external drive '0', internal drive '1'. Ideal for PC Emulator as 5.25" drive becomes A:Internal B: £8.00.

Drive Select Translation Cable

When used with above, interface links in external drive can stay set to '0', saves hassle when moving a drive from a Beeb. £9.00.

DFS Reader

This program will transfer the files on a DFS disk globally or selectively to an *Archimedes* disk quickly and simply. £15.00.

Monitor Switch Box

Archie/BBC. Plug both a BBC and an *Archimedes* into an *Archimedes* colour monitor. £10.00.

Archimedes <-> BBC RS423 link kit including file transfer software. £15.00.

PRICES INCLUDE VAT

P&P £1 or as quoted
TRADE & EXPORT ORDERS WELCOME please enquire for delivery cost.
Phone/Credit Card and Official Orders welcome.

C.J.E. MICRO'S (Dept. MU), 78 Brighton Road, Worthing, W. Sussex BN11 2 EN
(0903) 213361 (3 lines)

FONTAID

'FONTAID' NLQ Font designer for CANON/TAXAN & STAR NL10/LC10
(Archie version available).
Ring for a leaflet

SOFTWARE

'Multi Font NLQ' for most printers
(SWR workspace version now available)
'INFORM' Sideways Ram information system!
Ring for a leaflet

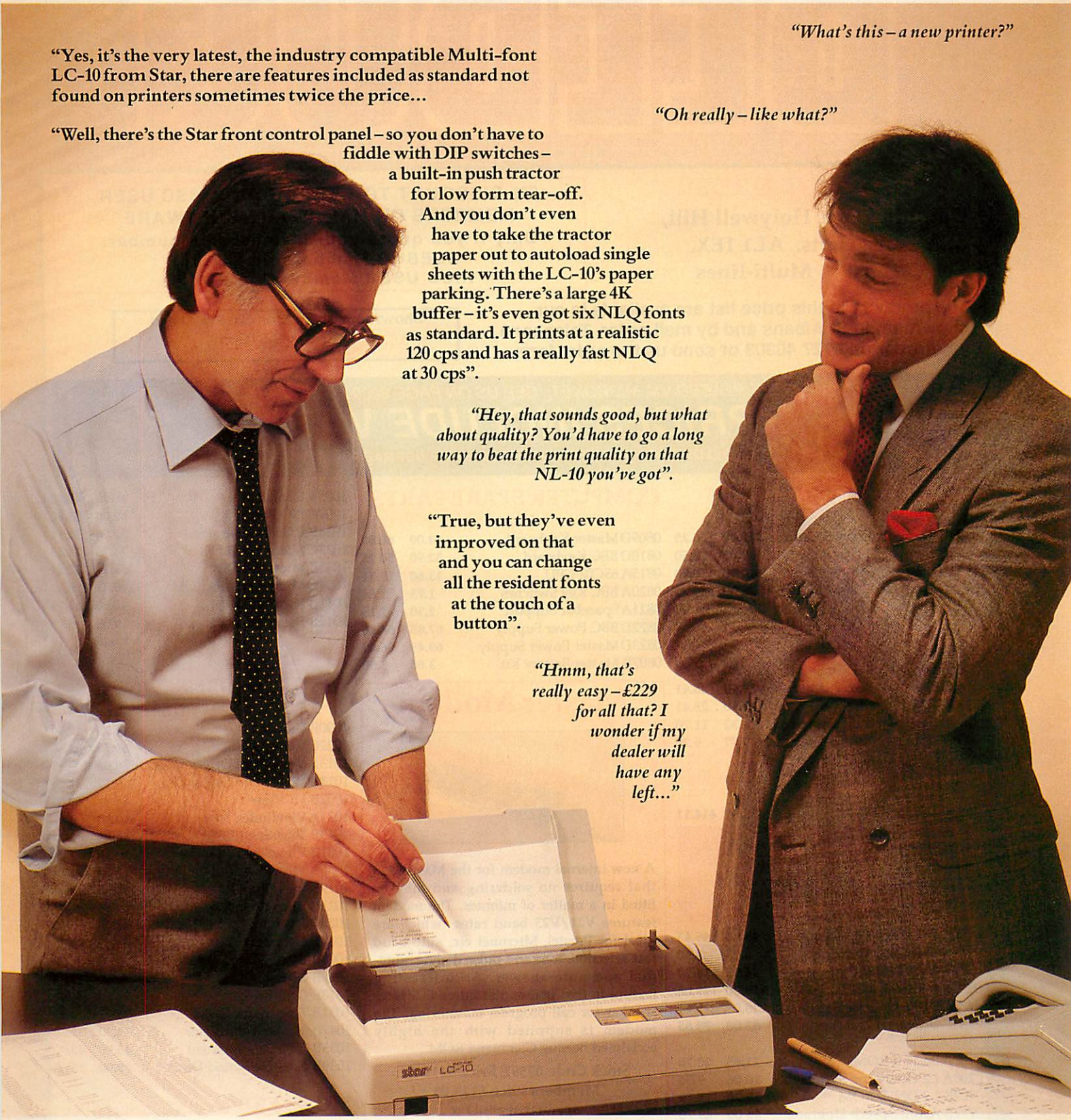
PRINTERS & MONITORS

PRINTERS
Star/Canon/Panasonic/Juki
MONITORS
Philips/Microvitec
Ring for best prices

Archimedes Acorn The choice of experience.

Special offers on ARCHIMEDES & MASTERS. Ring for details.
Officially approved ACORN/ ARCHIMEDES Dealer & Service Centre.
Come to our shop for a demonstration.

"£229 for all that?"



"What's this – a new printer?"

"Yes, it's the very latest, the industry compatible Multi-font LC-10 from Star, there are features included as standard not found on printers sometimes twice the price...

"Oh really – like what?"

"Well, there's the Star front control panel – so you don't have to fiddle with DIP switches – a built-in push tractor for low form tear-off. And you don't even have to take the tractor paper out to autoload single sheets with the LC-10's paper parking. There's a large 4K buffer – it's even got six NLQ fonts as standard. It prints at a realistic 120 cps and has a really fast NLQ at 30 cps".

"Hey, that sounds good, but what about quality? You'd have to go a long way to beat the print quality on that NL-10 you've got".

"True, but they've even improved on that and you can change all the resident fonts at the touch of a button".

"Hmm, that's really easy – £229 for all that? I wonder if my dealer will have any left..."

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A division of
Star Micronics Co., Ltd., Japan.

Price excl VAT.

I'd like to find out if my dealer has any left. Please send me an LC-10 brochure ☐
Please send me details of the Star range of dot matrix printers ☐ *Or just call Belinda on 01-840 1829.*

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0199G Compact Entry System	375.00	356.25
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0196G Compact Colour System	575.00	546.25

COMPACT ACCESSORIES

0227F Second 3.5" Disc Drive	108.00	102.60
0201B Compact RS232 Interface	29.90	28.41
0211C PAL TV Adaptor	29.90	28.41
0250C Compact 5.25" Disc Lead	12.32	11.70
0298B Compact Printer Lead	9.77	9.29

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0200G Master 128	435.91	414.11

Free Inter-word when buying a new Master Series Computer.

0234B M128 Econet Module	48.88	46.43
0781B Care Elec. Cartridge	8.95	8.50
0782B Care 4 Way Cart.	14.95	14.20
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0231D 80186 Co-Processor	228.85	217.41
0233F Universal 2nd Proc.	83.00	78.85
0207A Basic II ROM	21.85	20.76
0208A 1.2 Operating System	10.06	9.56
0209B 1.2 DNFS ROM	19.78	18.79
0212B Acorn Speech Upgrade	46.00	43.70
0217B 1770 Disc Interface	50.24	47.73
0218A ADFS Upgrade 1770	29.33	27.86
0225B Econet Upgrade BBC	48.00	45.60
0226B 64K Upgrade Kit B+	39.00	37.05

See separate advert for ARCHIMEDES

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0809D Master Keyboard	64.00	60.80
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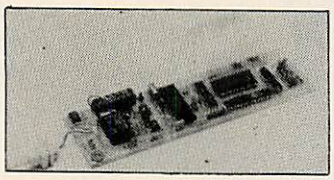
0815A 65C02 CPU	13.80	13.11
0820A BBC Key Switches	1.73	1.64
0821A Spacebar Support	2.30	2.18
0822D BBC Power Supply	67.85	64.46
0823D Master Power Supply	69.49	66.02
0807B Master Battery Kit	3.68	3.50

Master Modem



A new internal modem for the Master 128 that requires no soldering and may be fitted in a matter of minutes. The modem features V21/V23 baud rates which are ideal for Prestel, Micronet etc, auto-baud rate selection, tone and pulse dialing, auto-dial and auto-answer. An interesting feature is that it uses the internal Master speaker for call progress monitoring. The modem is supplied with the highly acclaimed Beebug Command ROM.

Stock Code 0759E Price £119.00
Members Price £113.05
Approval Applied For

ACORNSOFT LANGUAGES

0243B Master Lisp Cart.ROM	59.69	56.70
1003B Lisp ROM	48.00	45.60
0245B Master Logo Cart.ROM	67.85	64.46
1006B Logo	62.00	58.90
1004B BCPL	53.00	50.35
1026B BCPL Generator	43.57	41.39
1005B Comal	48.00	45.60
1007C ISO Pascal	62.00	58.90
1028B Pascal Generator	32.78	31.14
1027C Micro PROLOG	74.75	71.01
1033B Microtext Disc	55.20	52.44
1034C Microtext Plus ROM	240.01	228.00
1041B Forth ROM	45.00	42.75
1042B Forth Disc	19.00	18.05

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1000B View 2.1	44.28	42.06
1022C View 3.0 ROM	66.70	63.36
1013B View Print Driver Cassette	8.62	8.19
1014B View Print Driver Disc	9.77	9.29
1002B Hi-View	44.28	42.06
1021A ViewIndex Disc	13.80	13.11
1043B ViewSpell ROM	34.02	32.32
1001B ViewSheet	44.28	42.06
1030B ViewPlot	25.30	24.04
1019B ViewStore ROM	44.28	42.06
1023C View Professional	99.95	94.95
1020D Overview (M128)	98.90	93.96
1010D Overview (Compact)	98.90	93.96
1008B Basic Editor	28.00	26.60
1017B GXR B	28.00	26.60
1018B GXR B+	28.00	26.60
1031B Termulator ROM	31.05	29.50
1047B Master Termulator	34.50	32.78
1035B 6502 Development	45.00	42.75
1039B Creative Sound Disc	19.00	18.05

PRINTERS

0299G Panasonic KX-P1081	180.00	171.00
0304G Panasonic KX-P3131	290.53	276.00
0311G Taxan KP815	342.11	325.00
0316G Taxan KP915 15"	440.00	418.00
0322E Epson LX800	275.00	261.25
0327G Star NL-10	285.00	270.75
0328G Epson FX800	405.00	384.75

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0530G	Microvitec 1431 Mon.	239.00 227.05
0531G	Microvitec 1451 Mon.	289.00 274.55
0535G	Supervision 625 RGB	379.50 360.53
0536G	Supervision 620 RGB	318.55 302.62
0551E	Single Master Plinth	16.10 15.30
0559F	Double Master Plinth	28.75 27.31
0552E	Single BBC B Plinth	12.65 12.02
0553F	Double BBC B Plinth	23.00 21.85

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0614F	CS100E additional drive	118.45 112.53
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0603F	CS400 as above with PSU	162.15 154.04
0615F	CS400E additional drive	155.00 147.25
0604G	CD800S Double 40/80 track	286.35 272.03
0617G	CS354 Single 3.5" with PSU	132.95 126.30
0618G	CD358 Double 3.5" with PSU	229.42 217.95
0619G	CCD2000S Dual 3.5"&5.25"	308.27 292.86
0650B	10 x Memorex Discs SS 40	15.50 14.73
0651B	10 x Memorex Discs DS 80	25.50 24.22
0669B	10 x Memorex 3.5" Discs	25.00 23.75
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0648B	Disc Head Cleaner (3.5")	9.65 9.17
0655C	Lockable Disc Box (50)	13.80 13.11
0656C	Lockable 3.5" Disc Box (40)	11.05 10.50

WATFORD HARDWARE

0214B	Watford DDFS Kit	56.35 53.53
0216B	Watford DFS Manual	6.95 6.60
0219B	Watford 1.43 DFS Kit	62.10 59.00
0702B	32K RAM Card	67.28 63.91
0709D	Watford Eprom Eraser	33.35 31.68
0717B	Watford Sideways ZIF	17.83 16.93
0736B	Solderless ROM Board	36.80 34.96
0737B	Watford Battery	4.37 4.15
0752B	Watford Diagnostic Disc	23.00 21.85
0755B	Write Protect Mk12	2.76 2.62
0739C	Watford Video Digitiser	113.00 107.35
0429B	Watford NLQ Epson	28.75 27.31
0748F	Co-Pro Adaptor	55.00 52.25
0785C	Quest Mouse & Paint	67.85 64.46

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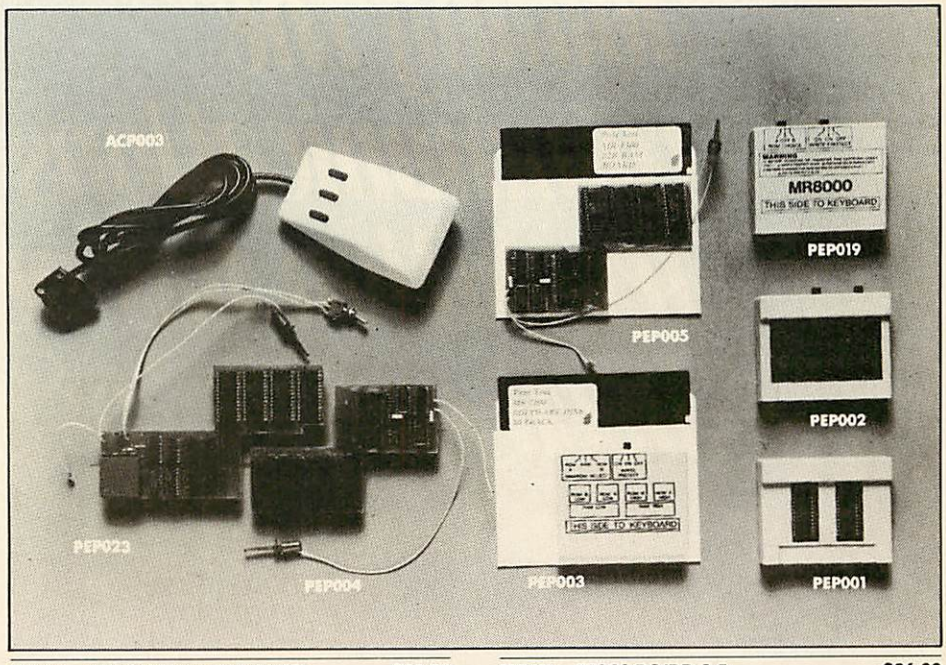

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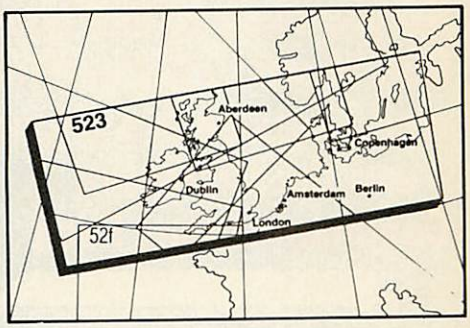

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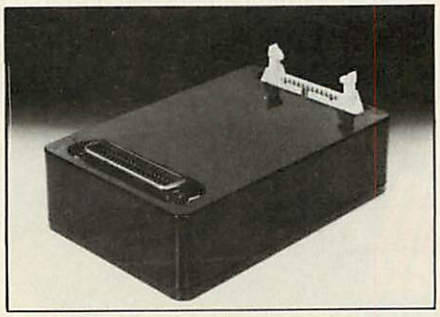

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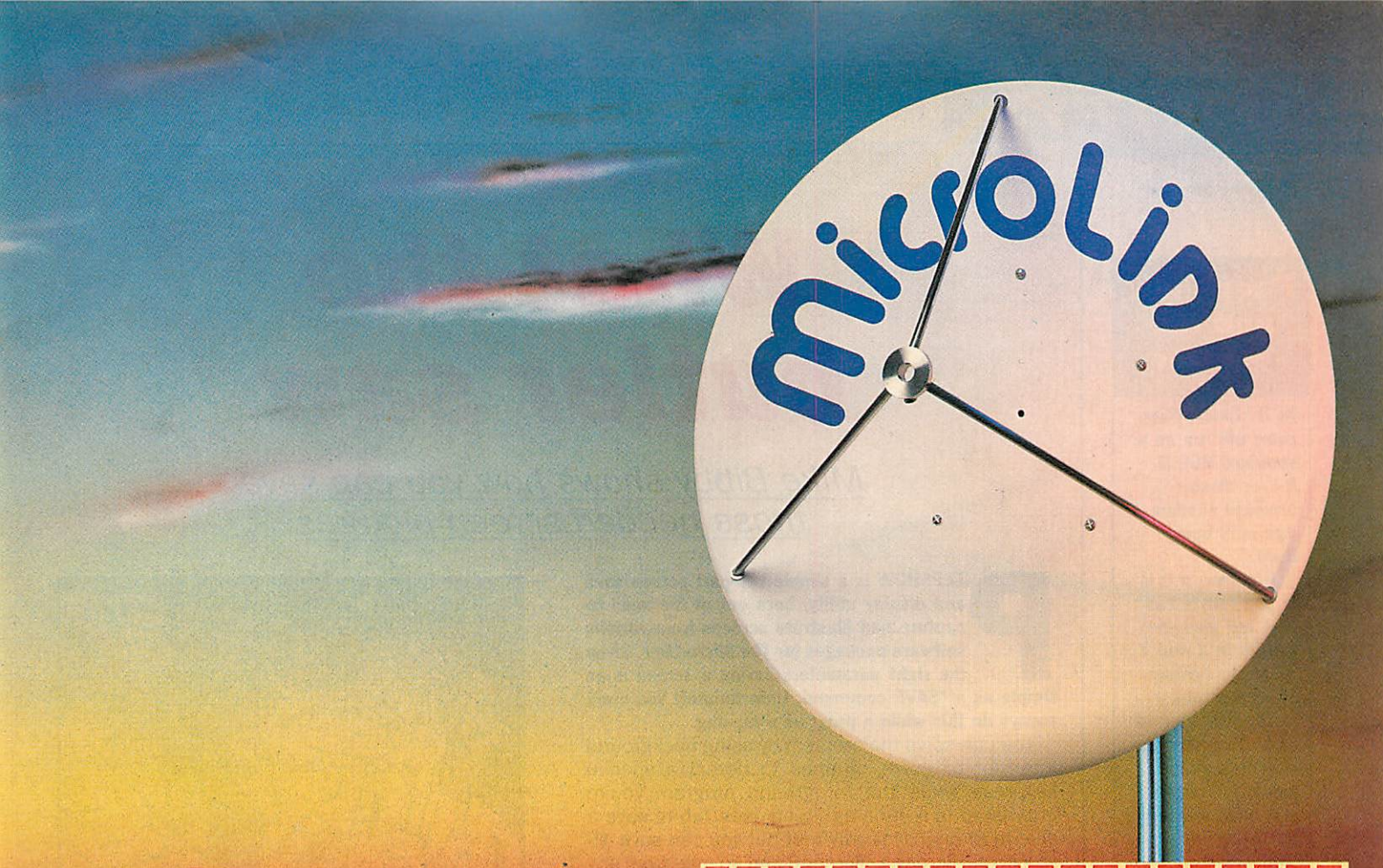

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A424

B B+ M

Peepshow and the Master

As it stands, Peep show will run on a standard BBC B, B+ or Master provided shadow ram isn't being used.

However, if it is in use osbyte call &84 will give you &8000 in *X* and *Y* – not the bottom of screen ram.

You will need to make sure that the shadow screen memory is paged into main memory by calling osbyte &6C with X=1. You can page it out with X=0.

As for shadow on the B+: That – I'm glad to say – is a mystery to me.

I'd be pleased to hear of anyone's success at adapting Peepshow for it.

What the butler saw

Mike Bibby shows how you can save those needed screen pictures

PEEPSHOW is a simple two-part screen save and display utility, born out of the need to capture and illustrate screens from various software packages for *The Micro User*. Given the right parameters saving a screen is as simple as a *SAVE command. Unfortunately you can't always do this while a program's running.

You can solve the problem by using background interrupt or event routines to detect a special keypress while the foreground program you're interested in is running: Peep uses Tab to save a screen to disc. Not only that but you can save 15 screens – ScreenA, ScreenB and so on – from any mode. And their colour palette data is also stored – unlike so many other utilities. To see what I mean try entering:

```
MODE 6
VDU 19,1,3;0;
*SAVE SCREEN 6000 8000
```

This will save you a file – called Screen – of the current Mode 6 display with its yellow writing. However, if you press Break and enter:

```
MODE6
*LOAD SCREEN
```

you'll get your screen back but with white not yellow text. To recreate the real screen we need to restore the colour palette data.

Peep uses a file called Pixdata to record the number of screens saved, their modes and palette configurations. The program consists of two sections, the first – *initialise* – looks like this:

```
create file Pixdata
initialise screen count
preserve old event vector
insert new event vector
enable keypress event
```

The way Peep is listed, *initialise* ends with an

RTS. In other words the routine isn't daisy-chained to the old event routine – if any. Once you've got Peep up and running properly you can delete this line and remove the backslash from the next one to make this section's last instruction:

```
.old_event_routine JMP (oldevent)
```

This links the routine into the old one in case the program you're *snapping* uses it too. The routine that does the hard work – *detect* – acts as follows:

```
check for keyboard event
if found put registers on stack
if tab then
   update pixdata
   save screen
pull registers from stack
pass on to old event routine
```

Updating Pixdata is the hardest part of all this. The first byte of the file contains the number of screens saved, so this is incremented. We then have a 17 byte record for each screen: The initial byte is the mode of the screen and the next 16 give the actual colours associated with the log-

USING PEEPSHOW

*Take a blank disc and run Peep to set up the interrupt routine and put a blank Pixdata on your screen capture disc in drive 1. Now run the program whose images you want to capture. If you normally use Shift+Break to run it, use *EXEC !BOOT or *RUN !BOOT to get it going – pressing Break will destroy the link to the event routine.*

Press Tab whenever you want to capture a screen. When you're done you can run Show to display what you've got on your disc. Just press a key to move to the next screen.

In general Peep won't work with protected software, which wipes out user event and interrupt routines as standard practice.

ical colours from 15 down to 0.

Rather than use random access filing, which would involve using zero-page locations, the routine *update_pix* opens the file with *osfind*. It then uses *osbput* to store the new number of screens in the first byte, followed by the required number of dummy *osbget*s to move the file pointer to the record for the new screen.

Then comes the equivalent of a *FX135 followed by *osbput* to store the screen's mode, and then 16 calls to *update_pal*. The latter reads the actual colours associated with logical colours 15 to 0, and stores the relevant bytes sequentially in Pixdata before closing the file.

That's all there is to Peep, though there's plenty of room for improvement. The listing is fairly comprehensively annotated, so following how it works shouldn't be too hard.

The second program — Show — displays our screens in all their glory. Because it doesn't run in the background, it can get away with being in Basic and uses the algorithm shown on the right.

And that's it. Together Peep and Show let you capture and display your screens in their true colours.

WHERE TO GO FROM HERE

No matter where you finish a program, there are always improvements you could make. Peep and Show are no exceptions, so here are some modifications you could try:

- *As printed, the screens are saved to and accessed from drive 1. You could adapt the programs to make this optional.*
- *Peepshow is restricted to 15 screens. This is an artificial limitation because of Pixdata's 256 byte size: I didn't want to use random access filing, zero page locations or indexing. But if you're saving mostly Mode 7 screens, you might feel the restriction is unnecessary.*
- *When you initialise Pixdata it wipes out any previous version on disc. You could adapt things so that you could add to it, create a new one or even edit an old version.*

```
open pixdata                        cursor off
read number% of files               clear screen to show palette
for 1 to number%                    *load screen for number%
    bget mode and change to it      beep, wait for key
    for 15 to 1                   endfor
        bget actual colour        close all files
        write it to palette       restore cursor, mode 6
    end for                       end
```

Program 1

```
10 REM PEEP
20 REM by Mike Bibby
30 REM (c) The Micro User
40 oswrch=&FFEE
50 osbyte=&FFF4
60 osfile=&FFDD
70 osfind=&FFCE
80 osbput=&FFD4
90 osbget=&FFD7
100 osword=&FFF1
110 eventv=&220
120 code%=&900
130 FOR L%=0 TO 3 STEP 3
140 P%=code%:[OPT L%
150 .start
160 \create pix_data file
170  JSR init_pix
180 \initiate screen count
190  LDA #00:STA screen_no
200  LDA #64:STA screen_label
210 \preserve old event vector
220  LDA eventv:STA oldevent
230  LDA eventv+1:STA oldevent+1
240 \link new event vector
250  LDA #detect MOD&100:STA eventv
260  LDA #detect DIV&100:STA eventv+1
270 \ *fx14,2 enables keypress event
280  LDA #14:LDX #2:JSR osbyte
290  RTS
300 \=== Exits routine keypress ===
310 \=== linked, PIXDATA set up ===
320 \============================
330 \=== This routine linked to ===
340 \===  normal event routine  ===
350 .detect
360 \ check for keypress event
370  CMP #2
380  BNE old_event_routine
390 \ key found _ check for Tab
400  PHP:PHA
410  TYA:PHA
420  TXA:PHA
430 \check penultimate keypress
440  LDA &ED
450  BNE not_tab
460 \check last keypress
470  LDA &EC
480  CMP #(&60+&80)
490  BNE not_tab
500 \tab definitely pressed
510 \so screen to be saved
520  INC screen_no:INC screen_label
530  JSR update_pix
540  JSR save_screen
550 .not_tab
560  PLA:TAX
570  PLA:TAY
580  PLA:PLP
590 \replace next RTS with following
600 \JMP (oldevent) line when debugged
610 .old_event_routine RTS
620 \.old_event_routine JMP (oldevent)
630 \===   End of user event    ===
640 \=== Links to old routine   ===
650 \=== and does RTS from there===
660 .update_pix
670 \open pixdata r/w
680  LDA #&C0
690  JSR open_pix
700 \put new screen_no as first byte
710  LDX screen_no:TXA
720  JSR osbput
730 .move_record
740 \moves 17 bytes along pixdata
750 \for each screen. X holds
760 \screen_no - 1
770  DEX
780  BEQ positioned
790 \put X on the stack, then
800 \use as a counter. Y has
810 \handle already
820  TXA:PHA:LDX #17
830 \move along a byte by reading
840 \ignore what's actually read
850 .move_byte JSR osbget
860  DEX:BNE move_byte
870  PLA:TAX
880  JMP move_record
890 \----------------------------
900 .positioned
910 \now at appropriate record
920 \use *fx &87 to put mode in Y
930 \put mode on file
940 \then actual colours
950  STY handle
960  LDA #&87
970  JSR osbyte
980 \move mode into A
990  TYA
1000  LDY handle
1010  JSR osbput
1020 \now find and save the
1030 \actual colours
1040  JSR update_pal
1050 \close files (pixdata)
1060  LDA #0
1070  JSR osfind
1080  RTS
1090 \----------------------------
1100 .init_pix
1110 \set pixdata=256 zero bytes
1120 \open for writing
1130  LDA #&80
1140  JSR open_pix
1150  LDA #0:TAX
1160 .fill_file
1170  JSR osbput
1180  DEX
1190  BNE fill_file
1200 \now close file (A zero)
1210  JSR osfind
1220  RTS
1230 \----------------------------
1240 .open_pix
1250  LDX #pixdata AND&FF
1260  LDY #pixdata DIV&100
1270  JSR osfind
1280   TAY \move handle to Y
1290  RTS
1300 \----------------------------
1310 .save_screen
1320 \*fx &84 makes X,Y point to
1330 \base of screen memory
1340  LDA #&84
1350  JSR osbyte
1360 \setup param_block for osfile
1370  STX load:STX exec:STX from
```

Turn to Page 24 ▶

◀ From Page 23

```
1380  STY load+1:STY exec+1:STY from+1
1390  LDY#0:STY to
1400  LDY#&80:STY to+1
1410  LDY #&FF:STY exec+2:STY from+2:ST
 to+2
1420  STY load+3::STY exec+3:STY from+3
STY to+3
1430  LDX #param_block AND&FF
1440  LDY #param_block DIV&100
1450  LDA #0:JSR osfile
1460  LDA #8:JSR oswrch
1470  RTS
1480 \-----------------------------
1490 .update_pal
1500 \update palette. Save 16 actual
1510 \colours associated with logical
1520 \colours 15 to 0 in pixdata
1530  LDA #15
1540  STA pal_block
1550 .next_col LDA #&0B
1560  LDX #pal_block AND&FF
1570  LDY #pal_block DIV&100
1580  JSR osword
1590  LDA pal_block+1
1600  LDY handle
1610  JSR osbput
1620  DEC pal_block
1630  BPL next_col
1640  RTS
1650 \-----------------------------
1660 .param_block
1670  OPT FNw(filename)
1680 .load OPT FNd(0)
1690 .exec OPT FNd(0)
1700 .from OPT FNd(0)
1710 .to OPT FNd(0)
1720 .filename
1730  OPT FNs(":1.screen")
1740 .screen_label OPT FNb(0)
1750  OPT FNb(&0D)
1760 .pixdata
1770  OPT FNs(":1.pixdata")
1780  OPT FNb(&0D)
1790 .handle OPT FNb(0)
1800 .screen_no OPT FNb(0)
1810 .pal_block OPT FNb(0)
1820  OPT FNd(0)
1830 .oldevent OPT FNw(0)
1840 \-----------------------------
1850  ]
1860 NEXT:CALL start:END
1870 DEF FNb(B%):?P%=B%:P%=P%+1:=L%
1880 DEF FNw(W%):!P%=W%:P%=P%+2:=L%
1890 DEF FNd(D%):!P%=D%:P%=P%+4:=L%
1900 DEF FNs(s$):$P%=s$:P%=P%+LENs$:=L%
```

Get it right!

```
  10 =    0 0     300 =    0 3
  20 =    0 0     310 =    0 3
  30 =    0 0     320 =    0 3
  40 =   78 8     330 =    0 3
  50 = 7966 A     340 =    0 3
  60 = BC36 9     350 = A739 A
  70 =  247 D     360 =    0 A
  80 = 1511 4     370 = 22BB 6
  90 = FA93 0     380 = 5E0F A
 100 = 4EF9 2     390 =    0 A
 110 = 1927 D     400 = 5EFB C
 120 = F179 3     410 = 6E12 E
 130 = 10C9 5     420 = 2BB2 E
 140 =  61D 1     430 =    0 E
 150 = 3208 B     440 = A15E 0
 160 =    0 B     450 = A21E 6
 170 = D743 4     460 =    0 6
 180 =    0 4     470 = D1B9 D
 190 = 3356 2     480 = F532 9
 200 = 666C 6     490 = A21E E
 210 =    0 6     500 =    0 E
 220 = 9356 E     510 =    0 E
 230 = DFBF 3     520 = 30EF 0
 240 =    0 3     530 = 8295 9
 250 = 3AD3 1     540 = E12E 1
 260 = 1D6D 9     550 = BB92 F
 270 =    0 9     560 = 1311 B
 280 = 3292 5     570 =  330 1
 290 = 9843 3     580 = 3885 0
 590 =    0 0     920 =    0 C     1250 = 968C 0     1580 = 62D8 3
 600 =    0 0     930 =    0 C     1260 = A43E 3     1590 = 5F79 2
 610 = B9F7 C     940 =    0 C     1270 = FB75 4     1600 = 8579 3
 620 =    0 C     950 = 14A0 1     1280 =  512 A     1610 = 21CE C
 630 =    0 C     960 = 8E35 B     1290 = 9843 3     1620 = C3B9 1
 640 =    0 C     970 = 8E7E 5     1300 =    0 3     1630 = 2840 1
 650 =    0 C     980 =    0 5     1310 = 1764 F     1640 = 9843 2
 660 = 88C2 C     990 = 6ECC E     1320 =    0 F     1650 =    0 2
 670 =    0 C    1000 = 8579 5     1330 =    0 F     1660 = D5F7 9
 680 = 2A71 F    1010 = 21CE 9     1340 = BE56 7     1670 = 6E40 6
 690 = 1B6C C    1020 =    0 9     1350 = 8E7E 1     1680 = F156 8
 700 =    0 C    1030 =    0 9     1360 =    0 1     1690 = 9989 F
 710 = A2E0 B    1040 = 5989 7     1370 = 799D C     1700 = DB8E B
 720 = 21CE E    1050 =    0 7     1380 = 23A4 C     1710 = C1E4 0
 730 = 318E 6    1060 =  295 6     1390 =   95 B     1720 = 39F8 F
 740 =    0 6    1070 = FB75 0     1400 = 662F 2     1730 = 5CEF A
 750 =    0 6    1080 = 9843 C     1410 = D945 E     1740 = E719 7
 760 =    0 6    1090 =    0 C     1420 = 2930 4     1750 = B9F3 1
 770 = E8A9 9    1100 = 3522 0     1430 = 2CFF 3     1760 = EE2B 9
 780 = FC15 8    1110 =    0 0     1440 = 4C38 F     1770 = A9E9 2
 790 =    0 8    1120 =    0 0     1450 = 622D F     1780 = B9F3 3
 800 =    0 8    1130 = FED2 2     1460 = 6697 C     1790 = 5E8E 6
 810 =    0 8    1140 = 1B6C 4     1470 = 9843 6     1800 = 9E32 D
 820 = 8411 7    1150 = 5DED B     1480 =    0 6     1810 = 2219 C
 830 =    0 7    1160 = BA51 9     1490 = 53DE 4     1820 = BD48 2
 840 =    0 7    1170 = 21CE 4     1500 =    0 4     1830 = 5256 0
 850 = 90CB 7    1180 = E8A9 B     1510 =    0 4     1840 =    0 0
 860 = C254 5    1190 = 53BE A     1520 =    0 4     1850 = 8B58 2
 870 = 1311 C    1200 =    0 A     1530 = E085 2     1860 = F75C 7
 880 = 6BF9 F    1210 = FB75 F     1540 = 8B93 B     1870 = 9BB4 E
 890 =    0 F    1220 = 9843 A     1550 = 68DA 8     1880 = EAA2 1
 900 = 8169 C    1230 =    0 A     1560 = A334 9     1890 = 7E0B E
 910 =    0 C    1240 = F90D 9     1570 = 22DD A     1900 = A3C2 1
```

Program II

```
 10 REM SHOW
 20 REM by Mike Bibby
 30 REM (c) The Micro User
 40 osword=&FFF1:oscli=&FFF7
 50 DIM parms%4
 60 Load$="LOAD :1.screen"
 70 pixdata=OPENIN":1.pixdata"
 80 number=BGET#pixdata
 90 FOR screen=1 TO number
100 mode=BGET#pixdata:MODE mode
110 FOR logical=15 TO 0 STEP -1
120 actual=BGET#pixdata
130 PROCpalette(logical,actual)
140 NEXT:VDU23,1,0;0;0;0;
150 PROCos(Load$+CHR$(screen+64))
160 VDU7:wait$=GET$:NEXT
170 CLOSE#pixdata
180 VDU23,1,1;0;0;0;:MODE7:END
190 DEF PROCpalette(L%,B%)
200 LOCAL A%,X%,Y%
210 parms%?0=L%:parms%!1=B%
220 X%=parms%AND&FF:Y%=parms%DIV&100
230 A%=&0C:CALL osword:ENDPROC
240 DEF PROCos($&700):LOCAL X%,Y%
250 Y%=7:CALL oscli:ENDPROC
```

Get it right!

```
  10 =    0 0     140 = 5C58 8
  20 =    0 0     150 = 9B1F 4
  30 =    0 0     160 = 590C 5
  40 = B8D9 9     170 = C906 4
  50 = 129E D     180 = 9A42 2
  60 = 1332 3     190 = 147A 6
  70 = C342 2     200 = ABF4 4
  80 = C921 7     210 = 474B 9
  90 = 49D9 2     220 = 5AA4 B
 100 = 56B0 F     230 = 8F3D C
 110 = 8CA6 F     240 = 61B0 A
 120 = A908 1     250 = 7002 7
 130 = 7F07 4
```

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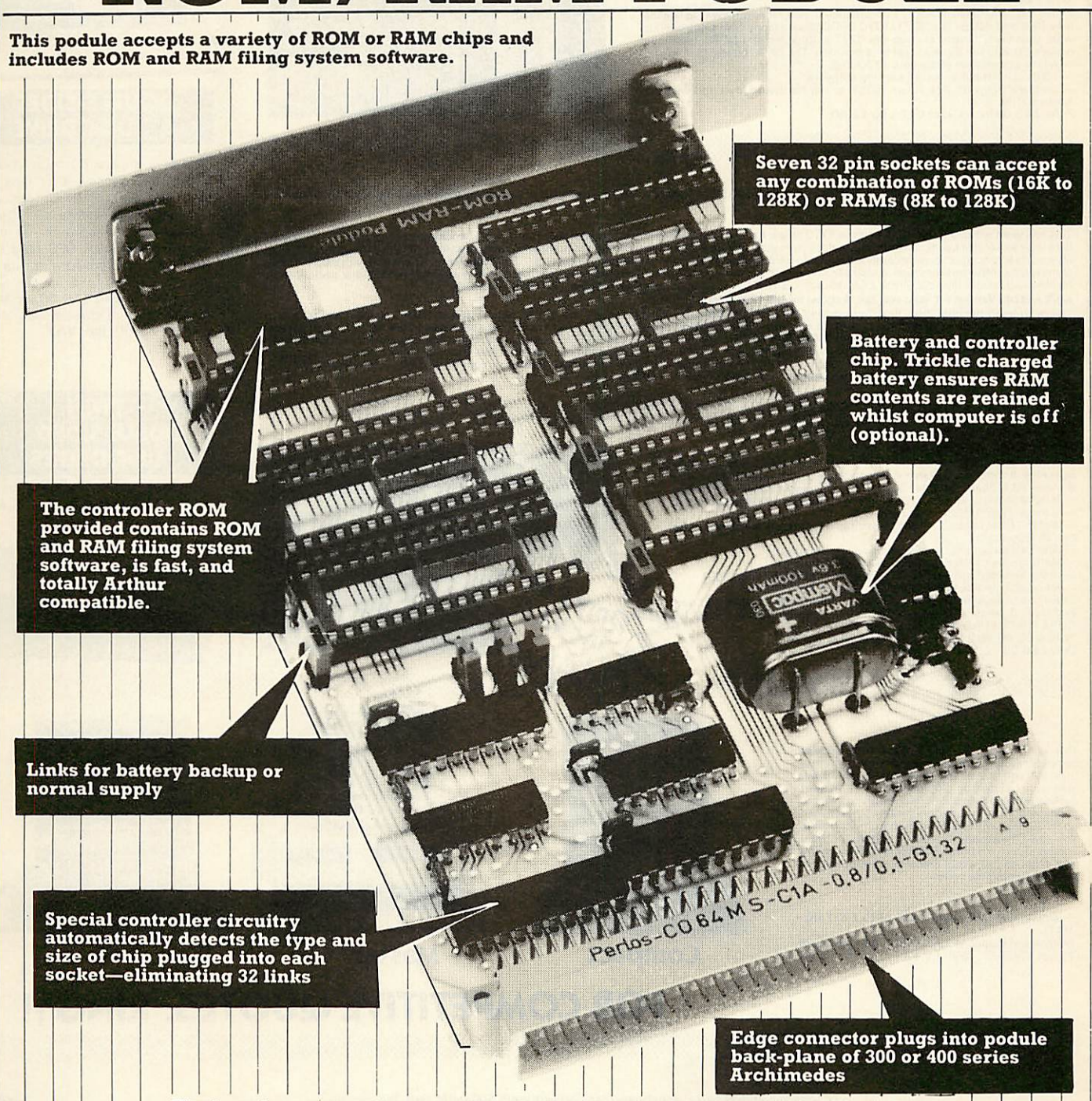

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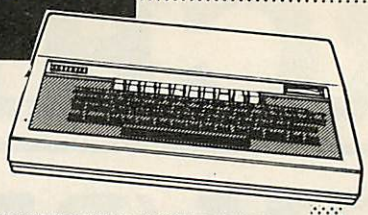

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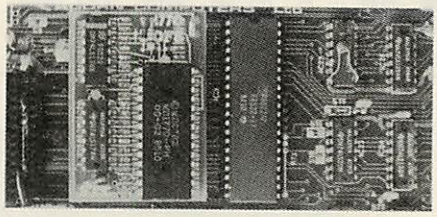

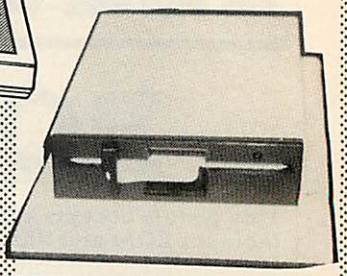

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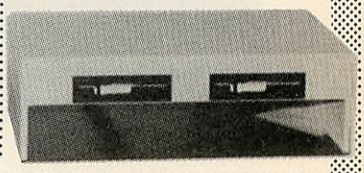

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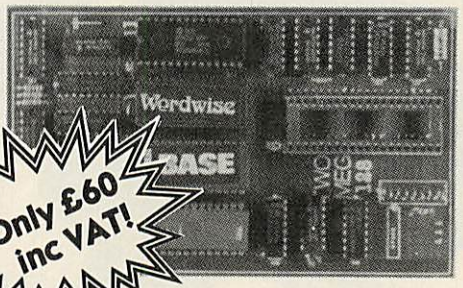

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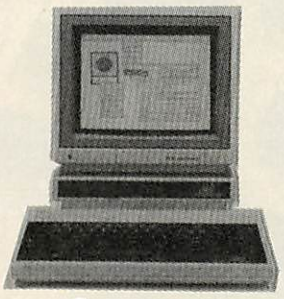

Compact

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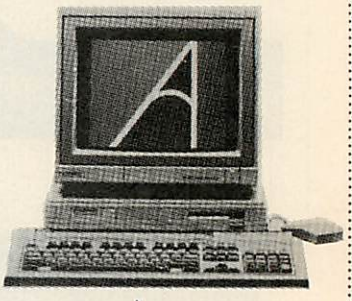

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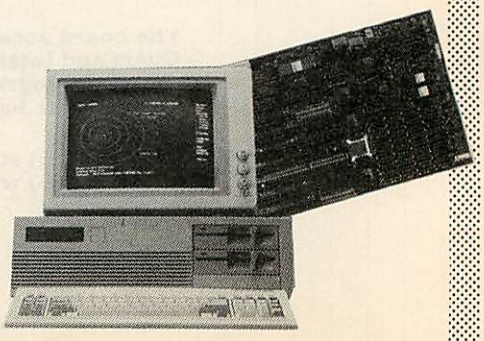

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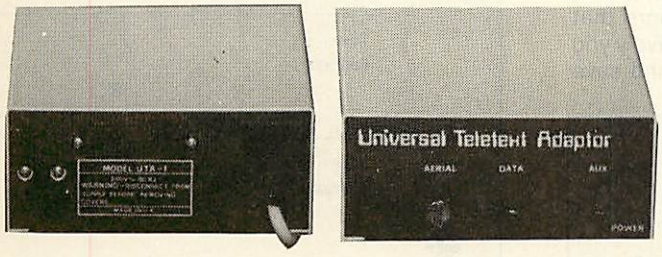

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All the fax fit to print

Tired of having to fork out for personal organiser refills? Alan McLachlan assesses a product that provides a neat solution

Points for

- Easy to use
- Produces good results

Against

- Poor manual
- Slightly messy programming

FAX*FILE Organiser from Mewsoft is a handy suite of programs designed to enable owners of personal organisers to create and print standard replacement pages and in particular to tailor their own specialised forms to individual needs. Supplied on a single disc in either 40 or 80-track format, it is simplicity itself to use.

It is function key and menu driven using a highlight cursor bar and provides three programs: Two specifically tailored to printing an address book and a calendar/diary, while the third is a form designer.

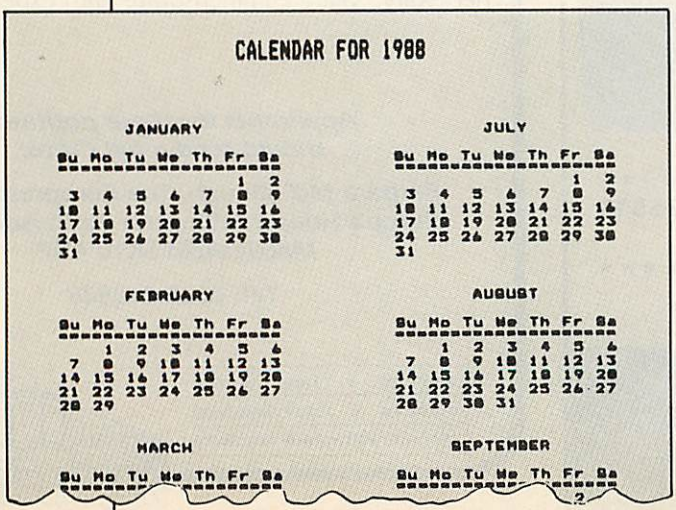
I was, and still am, one of the most unorganised people you could hope to avoid. Never a day goes by without my forgetting about that important telephone call or appointment. A time manager was the answer. But what I needed was one that would keep my car keys until I had fulfilled all my daily commitments.

Anyway, I took the plunge and bought one, persevered with it, but after I'd been using it for some time I realised the need for some different forms. These, for what they are, are pricey, and a lot of them were not quite what I wanted. What I really needed was The Fax*File Organiser.

The Address Book module creates a page for names, addresses and telephone numbers that you can print blank if you prefer. Alternatively you can enter as many details as you wish and save the data to disc from where it can be recalled, edited and sorted into alphabetical order. It only sorts on the first letter of the name field, so it's surnames first if you want to do the job properly. Not a tremendous imposition.

Also, the author has only allowed 11 characters in the phone number field – fine for storing nine-digit London numbers, but a bit of a pain to accomodate 061, 051 and 021 prefixes unless you leave out one of the spaces. But again this is a minor gripe.

From one file it can produce eight pages each



CALENDAR FOR 1988

JANUARY

Su	Mo	Tu	We	Th	Fr	Sa
					1	2
3	4	5	6	7	8	9
10	11	12	13	14	15	16
17	18	19	20	21	22	23
24	25	26	27	28	29	30
31						

FEBRUARY

Su	Mo	Tu	We	Th	Fr	Sa
	1	2	3	4	5	6
7	8	9	10	11	12	13
14	15	16	17	18	19	20
21	22	23	24	25	26	27
28	29					

MARCH

Su	Mo	Tu	We	Th	Fr	Sa

JULY

Su	Mo	Tu	We	Th	Fr	Sa
					1	2
3	4	5	6	7	8	9
10	11	12	13	14	15	16
17	18	19	20	21	22	23
24	25	26	27	28	29	30
31						

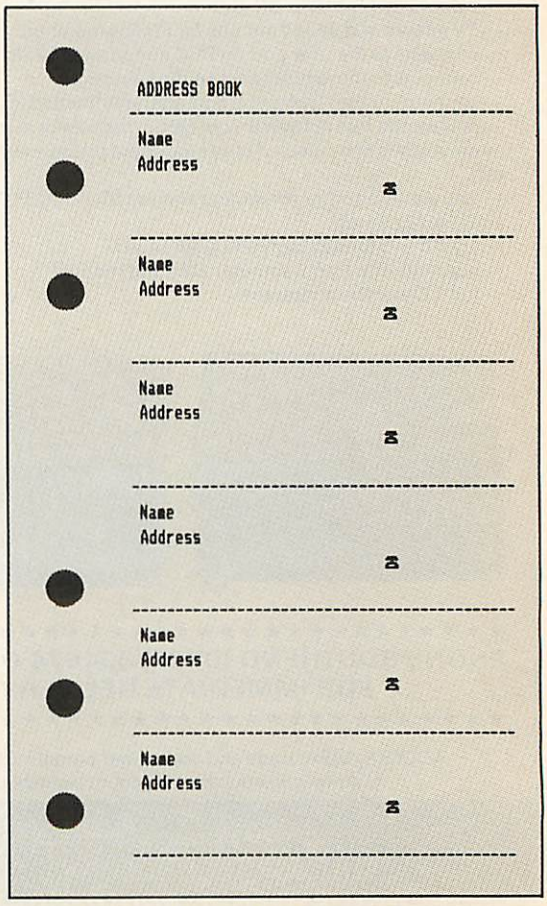
AUGUST

Su	Mo	Tu	We	Th	Fr	Sa
	1	2	3	4	5	6
7	8	9	10	11	12	13
14	15	16	17	18	19	20
21	22	23	24	25	26	27
28	29	30	31			

SEPTEMBER

Su	Mo	Tu	We	Th	Fr	Sa

A 12-month calendar



ADDRESS BOOK

Name
Address

Name
Address

Name
Address

Name
Address

Name
Address

Name
Address

Name
Address

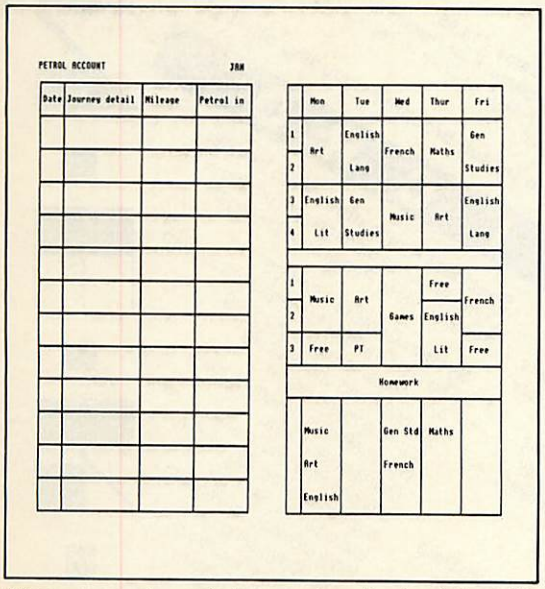
A page from the Address Book program produced on special paper

with six entries – in a similar format to my current organiser but with one entry less which provides more room for those longer addresses. This is going to prove useful at the end of the year – I won't need to buy the genuine replacements.

The Calendar/Diary provides neat printouts either a month or a week to a page. It too can be printed blank, or saved to disc with annual event information such as Bank Holidays, birthdays and anniversaries – they're the ones that catch me out – that you can edit as and when necessary. In fact anything you decide to include in the file will be reproduced when you output the hard copy – all you have to do is supply the year.

The Form Designer is the backbone of this suite and allows you to produce pages to your own specifications within the limits set. You design them using an on-screen editor based on a 24 by 44 character page. There are line drawing and text entry facilities and although these are limited they are adequate for the job and very simple to use. In no time at all I had produced the petrol account and the school timetable shown below.

There are one or two minor quirks in the package. For instance, unless you have previously



PETROL ACCOUNT JAN

Date	Journey detail	Mileage	Petrol in

	Mon	Tue	Wed	Thur	Fri
1	Art	English Lang	French	Maths	Gen Studies
2					
3	English Lit	Gen Studies	Music	Art	English Lang
4					

1	Music	Art	Games	Free	French
2				English Lit	
3	Free	PT			Free

Homework

Music Art English		Gen Std French	Maths	

All my own work – petrol account and school timetable

used the save option in any module, selecting to leave for the main menu will lose the data currently in memory. A confirmatory prompt here is a must – you might have selected Main Menu by accident.

Also, on one occasion when attempting to create a new file in the Diary, I received a *Disc full* error message that promptly threw me out of the program. During a save option in the Form Designer the same message put me back into the program with no loss of data until the next disc I inserted was also full – in which case I was again out of the program with no data. It's untidy and not acceptable programming practice. A telephone call to Mewsoft quickly pointed out these flaws and they should be resolved fairly quickly.

The programs are written in Basic and stored on an unprotected disc, so there should be no problems with the average programmer amending them to suit his own needs. In fact the manual gives guidelines on this in an attempt to overcome any printer problems that you might experience.

The manual is minimal and consists of eight photocopied A5 pages in booklet form. It confused me by leaving to the last paragraph a major point about using the Database Printer program to create a new file (see panel above). But if you read it in its entirety before you start – as I should have done – it should pose no problems. However, it's a pity the quality does not match the rest of the package.

For Master 128 owners an ADFS version of Fax-*File contains the complete set of of programs running from a single menu on one 80-track disc. The Address Book can store up to 120 entries in one file and a name search facility is also included. Special terms are available for any one wishing to upgrade to the ADFS version at a later date.

I have no reservations about recommending this product: It does what it sets out to do neatly, efficiently and with the minimum of fuss. And the cost as a one-off payment should be easily recoverable by anyone who uses their time manager to the full.

Will I use it? I will if I can find the time.

*Product: 1) Fax*File Organiser, 2) Fax*File Extension, 3) Special paper*
Price: 1) £12.95, 2) £9.95, ADFS version £22.90, 3) £5 (100 sheets) £20 (500 sheets)
Supplier: Mewsoft, 11 Cressy Road, London NW3 2NB.
Tel: 01-267 2642

THE FAX*FILE EXTENSION DISC

As a result of popular demand Mewsoft has also produced a supplementary disc of useful extra features: Label printer, Short address form, Database editor/printer and Calendar.

The Label printer uses the address book files to create single or multiple mailings. When opting to print singles you are presented with a list of the surnames from the address file and you select using the highlight cursor. The only restriction on multiple mailings is that you must print out the complete name and address file – there is no selection facility.

The Short form also uses the name and address book file to produce a list in a format to suit your own needs. This could be just name and telephone number or any format you require.

The Database is probably the most useful option on this disc and allows you to have on hand any information you choose. Its sort facility makes it useful for continually adding to and putting into alphbetical order, and an ideal use would be a shopping list or calorie chart. The creating and editing of files involves some disc swapping, and the only minor quirk is that formatting and viewing are only available via a Print File option which tests for the presence of the printer. This is somewhat restrictive and will be removed so that the printer is only tested when you actually want to produce the hard copy.

The Calendar option will output a complete 12 months of any year of your choice, to one page in condensed superscript type.

Mewsoft has also seen the need to provide specially designed fan-fold printer paper. It is 12cm wide with tractor feed guides, and is complete with six punched-out holes ready for a standard organiser.

The extension disc is a useful addition to the orginal set of programs. The paper is a bit of a luxury but will avoid having to mess about with printing on single blank personal organiser sheets or cutting ordinary fan-fold paper to size and having to buy the special punch.

The bottom line...

For anyone who regularly uses a time manager, it fills a need for DIY pages.

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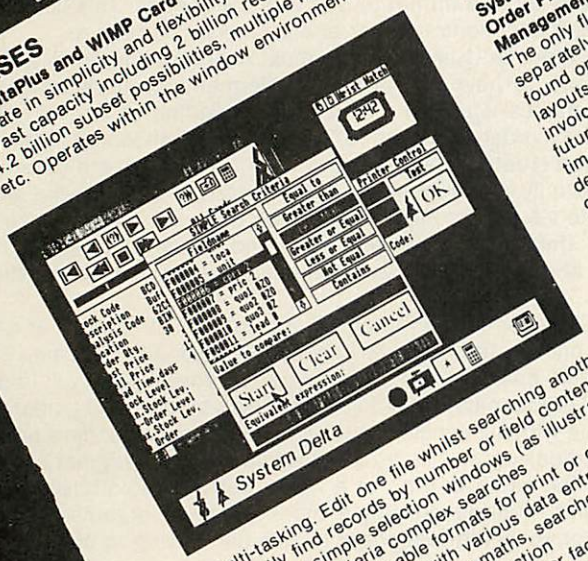

- Multi-tasking. Edit one file whilst searching another
- Instantly find records by number or field content
- Search by simple selection windows (as illustration) or multiple criteria complex searches
- Multiple user-definable formats for print or display
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- Unrivalled, comprehensive maths, searches and sort
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SOFTWARE SCENE

TETRIS ... nice game, shame about the price

Price: £8.99 (cassette), £12.99 (disc)
Supplier: Mirrorsoft, Athene House, 66-73 Shoe Lane, London EC4P 4AD.
Tel: 01-377 4645

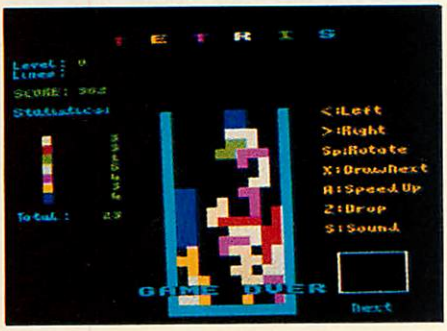
WHEN I first read Mirrorsoft's rather spartan description on the packaging of its latest release, my first thought was that it looked like a rather simple game which would have all the appeal of a plate of soggy cabbage. Yet after 'only five minutes I was hooked.

It's a very long time since I have sat up all evening, playing just one game – the last time it happened was when I first obtained a copy of Elite.

If anything, Tetris is too addictive I almost missed the deadline for this review because every time I sat down to write I couldn't resist having a quick couple of attempts at beating my previous high score.

First you enter your skill level – between 0 (novice) and 9 (superhuman). I would suggest that you have a few practice games at the novice level first. But be warned. By the time you've finished practising, you'll be well and truly hooked.

One slightly annoying aspect is that immediately you select the level, the game starts. I would prefer a short countdown period first – just one or two seconds to position my hands over the correct keys would be especially useful, particularly at higher levels when things tend to be fast and furious.



The challenge starts with a shape which appears at the top of the playing field and begins to drop towards the bottom. As it is falling you can move it left or right or rotate it so that when it reaches the bottom it is positioned as and where you want it.

Now dexterity and quick thinking enter the scene. Immediately the first shape reaches the bottom, another – which can also be manoeuvred and rotated – appears at the top and starts to fall.

The idea is to manipulate the continuous supply of seven different shapes so that they fit together almost like a jigsaw puzzle – the object being to form complete, unbroken lines horizontally across the playfield.

When a line is completed it disappears and everything above it drops down into the empty space.

The difficulty lies in the fact that if a line has a space in it, it won't drop down. The game ends when the shapes have reached the top of the playfield, which is 20 lines high.

The scoring system is arranged so that you get a number of points for every shape which fits into the playfield and extra points for forming complete lines.

Your score is also modified by the level of the game – the higher the level, the higher the score. The lowest level is slow and you have plenty of time to manouevre the shapes – the highest level is so fast that you hardly have time to realise what shape has appeared before it reaches the bottom.

As well as your score several other statistics are constantly displayed and updated on the screen. The useful ones are the total number of completed lines, the number of shapes which have been placed and the current level.

The inclusion of a table which tells you how many times each shape has appeared seems pointless. My guess is that when the game was prepared for release, someone decided that the screen looked a bit empty so they decided to fill it up a bit with something that would make things appear more complicated than they actually are.

The level of play increases after you have completed a number of lines. For instance, if you start at level 0 the game automatically speeds up to level 1 once you have completed 11 lines. Level 2 starts at 21 lines, and so on. You can increase the level yourself by pressing the A key.

There are three other useful keys which you can use: X shows the next shape that will appear, Z drops the current shape to the bottom extremely quickly and S allows you to turn off the sound, which comprises just a simple beep emitted when a shape reaches its resting place.

The pitch increases or decreases depending on how far up the playfield the shape lands.

I noticed a small glitch when I tried to type in my name on the high score table. The delay before a depressed key started repeating must have been reduced for some reason and when typing in DESMOND I tended to end up with DESSMONND or some other strange mutation.

My only real criticism, however, has nothing to do with the game itself. I would like to know how Mirrorsoft can justify the exceptionally high prices for a game which looks to be relatively simple piece of coding.

The cassette version is almost as expensive as the disc version of other, more complicated games, and close on £13 seems a bit excessive for a single game, no matter how good.

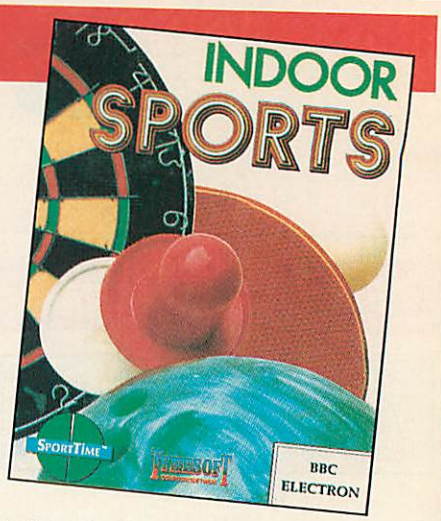
Desmond

Sound	*6*
Graphics	*7*
Playability	*10*
Value for money	*5*
Overall	*9*

SOFTWARE SCENE

INDOOR SPORTS ... for armchair fanatics

Price: £9.95 (cassette), £11.95 (disc)
Supplier: Tynesoft, Unit 3, Addison Industrial Estate, Blaydon, Tyne and Wear NE21 4TE.
Tel: 091-414 4611



I REMEMBER a long time ago in my youth going on trips to Blackpool and spending many a happy hour in the amusement arcades. My favourite pastime in those days was Air Hockey which was usually tucked away in one corner.

Now I can play the game again, but this time in the comfort of my own home and on my micro. Not only that, but if I feel like a quick game of Ping-Pong or Darts or perhaps 10 Pin Bowling all I need to do is load up Tynesoft's latest release, Indoor Sports.

A colourful title screen leads you to a menu of four games. Once you have made your choice you are presented with another menu to decide on the victory conditions, a solo or two player game or the demo mode.

For the one player game you can also set the level of the computer opposition. A jolly, but loud, tune accompanies this screen and gets a bit tedious after a while.

You'll soon learn to make your selections very quickly, as there isn't any way of switching the music off.

Ten Pin Bowling translates very well to this medium. The menu allows you to decide on the weight of the ball and the slickness of the alley.

I'm sure these must make a difference, but I decided to use the default settings – a 10lb ball and a slickness of 10.

The mechanics of bowling are quite complicated and involve deciding the starting position, selecting the amount of spin you wish to use and the angle of delivery.

Added to that is the possibility of releasing the ball too late and your bowler ending up flat on his face, or releasing it too soon – I would recommend that you do this at least once, as it's worth seeing the little man clutching his foot.

Once you've got the hang of it though, you can have quite exciting competitions against the computer or a friend.

The first few times I tried **Darts**, I had problems aiming and as a consequence, when I chose to play the computer it beat me easily.

The computer opponent was quite a challenge, especially when set at the expert level – it was just like playing Eric Bristow. But like a lot of things, a bit of practice and I started to look competent.

I've seen other dart simulations, but this is by far the best. There is even a chance that your dart will hit the wire and bounce back off the board.

Of the four games, **Ping-Pong** was the most enjoyable. It's played at just the right speed and a nice touch is the shadow of the ball visible on the table giving an almost three dimensional quality.

Here again I got a great feeling of satisfaction when I managed to beat the computer set at expert level.

The only thing which spoilt it for me was that, once I'd got the hang of it, I could beat the computer every time. The best way to play is with a friend using the two-player option.

Air Ball was the one I was looking forward to the most. To my dismay, it was the only disappointing game in the set. I found that no matter what level the computer was at, I beat it every time.

In fact the first time I set it at the expert level, I beat it 10 goals to 0. What makes it worse is that I didn't have to score all the goals myself – the micro managed to knock them in for me.

As I rely on playing against the computer a lot when reviewing games like this, Air Ball is too easy to beat. It's still a good game for two players though.

The quality of graphics in this collection is consistently high and, despite the annoying jingle, the sound effects are quite good.

What particularly impressed me is the amount of work which has obviously gone into it to produce simulations which come very close to being as much fun to play as the sports they are based on.

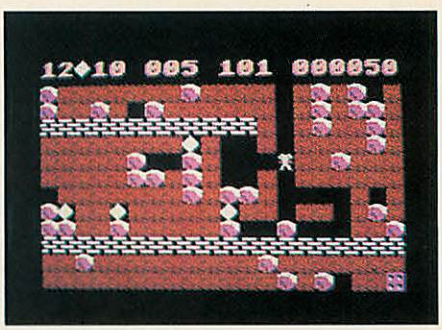
I think this is an excellent piece of software and one which I would recommend to anyone.

Desmond

Sound	8
Graphics	9
Playability	10
Value for money	5
Overall	9

BOULDERDASH ... rocky original

Product: Boulderdash
Price: £9.95 (cassette), £11.95 (disc)
Supplier: Tynesoft, Unit 3, Addison Industrial Estate, Blaydon, Tyne & Wear NE21 4TE.
Tel: 091-414 4611



BEFORE you say wearily, "Oh no, not another Repton-type game", let me put the record straight. Boulderdash has the enviable reputation of being the game which inspired Repton and all its clones all those years ago.

So why is it finally being released for the BBC Micro market, which by now must surely be saturated to bursting point with diamond-digging maze games? The answer is, as ever, that the original is usually the best. Not always, but in this case it is certainly true.

I, like many others, cracked my maze-digging teeth on Repton long before I ever heard of Boulderdash.

Little did I know that this newcomer actually pre-dated my favourite by quite a stretch.

Well, here it is at last and jolly good it is too. You play the part of Rockford, a cute little character who is a right little hoarder, and addicted to those big glistening diamonds scattered about the place just waiting to be scooped up.

Unfortunately, opposition to Rockford's greed lies in the form of hundreds of lethal boulders, deadly butterflies and a rapidly-growing, pulsating amoeba.

Most obviously dangerous are the boulders. Although this doesn't need explaining to Repton fans, they are imbedded in earth and digging for diamonds undermines their support. If a boulder falls on Rockford, it's curtains.

A large element of strategy is involved in turning things to your advantage. Boulders may be pushed either left or right, and as they will topple off the edge of a precipice – which can be dug carefully to suit your requirements – traps can be laid for the mutant butterflies.

Dropping a boulder on a butterfly mutates it into nine separate diamonds. As a set quota of these has to be collected, you'll find butterfly crushing is a necessary pastime – especially on levels deliberately low in their supplies of diamonds.

Collecting the full quota for a given screen causes a door somewhere in the maze to be activated. It won't always be near you, so when you hear the bang which signifies its opening, a quick dash is indicated, especially if time is running short – there is a time limit for each level.

The green amoeba encountered on later levels is a real pain. It grows at a phenomenal rate and after a certain point it will turn into hundreds of boulders, which will then rain destruction on Rockford's head. Another incentive to hurry things up.

My only niggle, oddly enough, was in the keyboard control. Rockford simply would not stop smartly on the spot when I released the keys.

Instead – during what were usually tightly calculated manoeuvres – he would plough ahead for one more move, totally mucking up the strategy and sometimes getting himself crushed under a deadly impromptu rockfall.

My verdict is that Boulderdash is the original diamond digging game and it's still the best ever. Buy it, even if you are an unshakeable Repton fan – you'll be amazed at just how addictive it can be and certainly won't be disappointed.

Chris Nixon

Sound	7
Graphics	8
Playability	9
Value for money	10
Overall	9

PLAY IT AGAIN SAM 2 ... a superior collection

Price: £9.95 (cassette) £11.95 (5.25in disc) £14.95 (3.5in disc)
Supplier: Superior Software, Regent House, Skinner Lane, Leeds LS7 1AX.
Tel: 0532 459453

WITH the original Play it Again Sam still high in the software charts, Superior has released Sam 2 – four more top class programs at a bargain price.

Galaforce is named after the Federation's elite pilots – how elite they are is debatable because you're the only one left!

It bears a strong resemblance to that BBC Micro classic Zalaga – with swirling clouds of aliens just waiting to be zapped. Zalaga owners should not be deterred by this, as the game is much more varied and the animation is fractionally better.

When assigned such missions I like to know that my ship is capable of tackling anything the enemy can throw at me. The Galaforce fighters certainly lack nothing in the firepower department – just hold down the fire button and watch the volley of electric death soar skywards.

There are 48 separate zones each consisting of six waves of aliens. Zone one is a piece of cake – just close your eyes and blast.

In zone two the alien-launching motherships are your main concern. By the time you have reached zone four, the aliens are beginning to unleash the heavy brigade – heavily armoured bombers hide behind a moving shields of aggressive fighters.

Galaforce really gets the adrenalin flowing – it's the kind of game you continue playing when you close your eyes in bed at night. It really should carry a government health warning.

The Repton programs are probably some of the longest running and best-loved series of games ever released for the BBC Micro. Play it Again Sam 2 includes **Repton 3** – in my opinion, the best of the four programs that have featured our green-skinned hero.

Repton 1 employed a series of individual mazes that had to be completed in sequence, but the graphics were a bit of a letdown. Repton 2 heralded the arrival of Repton as we know him today – big, bold and bright. Unfortunately, it used one huge maze which meant you had to complete the whole game in one session – a mammoth task.

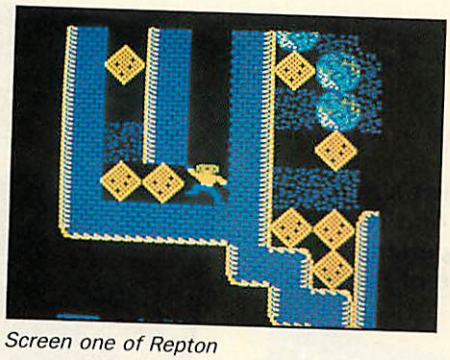
Version number three is an amalgamation of the best features of both, with a few surprises thrown in for good measure. The mega-sprites have been retained, but this time you have to battle your way through 24 individual mazes.

The successful completion of one is rewarded with a password – your key to the next maze. This system means that you don't have to wade your way through the lower levels each time you play: Just enter the password and begin on the highest level that you've reached.

In each maze Repton must collect a number of diamonds, a golden crown, and exterminate the monster population – and all before a time bomb explodes.

In the unlikely event of your solving every maze, Superior has also included a first rate maze-designing utility. Now that's what I call value for money.

Codename:Droid – otherwise known as Stryker's Run Part 2



Screen one of Repton

– bears little resemblance to its predecessor. The pure running, jumping and blasting arcade action of Stryker's Run has been replaced by a more leisurely paced arcade/adventure.

Commander Stryker's new mission involves the location and acquisition of the new state of the art Z11 spaceship. In order to protect it, the Volgans have secreted it deep within the bowels of the planet Volga.

As you descend you must fight your way through four heavily defended zones, each with three sub-levels. An extensive system of elevators gives you access to each level, but only if you are carrying a security pass.

The Volgan zones vary greatly in design. The rough-hewn rock caverns of the surface defence soon give way to the stone-built, gargoyle-infested Gothic designs of the ancient shrine.

Zone three is the site of the crew's quarters, so be prepared to fight your way through cafeterias and such like. It goes without saying that every level is crawling with Volgan guards and their fire power and armour rating increase as you descend.

Gameplay wise, Codename:Droid bears many similarities to the Repton series. You will often find, to your cost, that the most innocuous of actions can halt your progress completely – this is one challenge you won't complete overnight.

The final game of this Superior foursome is **Crazee Rider** – a wacky motorcycle race in which anything goes.

Donning your racing leathers you prepare to race around seven international circuits. You must finish in the first six if you want to move on to the next track – I played the game for a full hour before finally qualifying.

I don't know who set up the gearing on your machine, but they certainly made a mess of it.

In a field of 60 riders you are situated about fifth on the starting grid. As the green light shows, you hit the throttle and slowly pick up speed – everybody else is pulling wheelies as they scream up the straight.

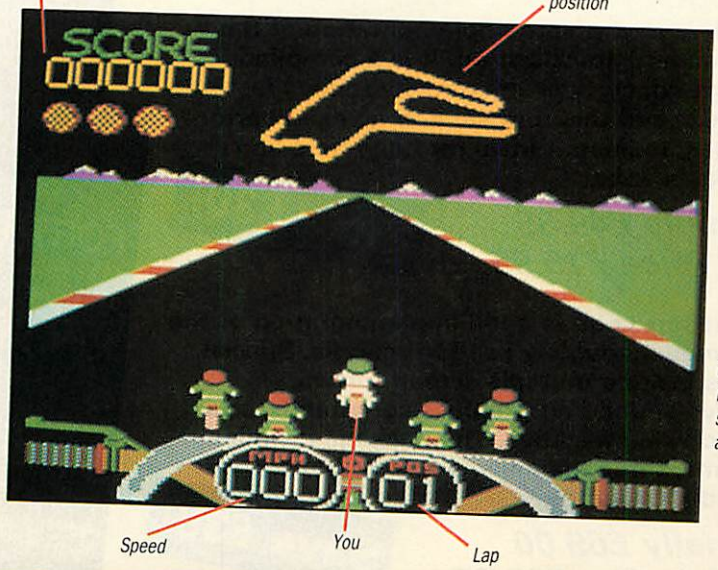
Within seconds of starting you are in 60th place. Only when you've really wound up the revs does your baby comes into its own, with a top speed far in excess of any other machine. By making full use of the on-screen circuit map, you can go flat out down the straights and throttle back at the last second before the bends appears.

The Crazee aspect of the game refers to the apparently acceptable practice of unseating your opponents – you receive 200 bonus points for each rider that bites the dust. By weaving left and right at the start, your sluggish get away can work to your advantage, as rider after rider collides with your rear end.

Play it Again Sam 2 cannot fail to reach number one in the software charts – for value and quality, nothing comes close!

James Riddell

Sound	*7*
Graphics	*9*
Playability	*9*
Value for money	*10*
Overall	*9*



Crazee Rider: The start of a race

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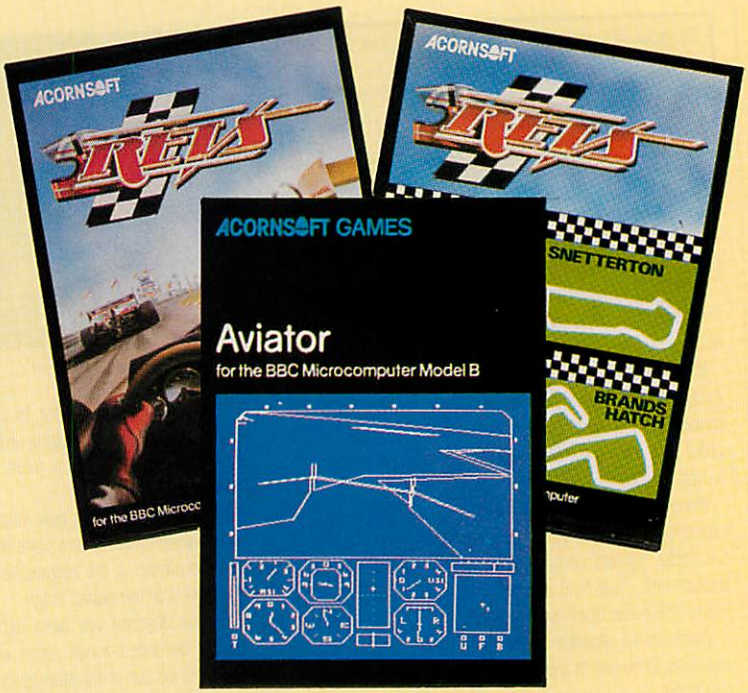

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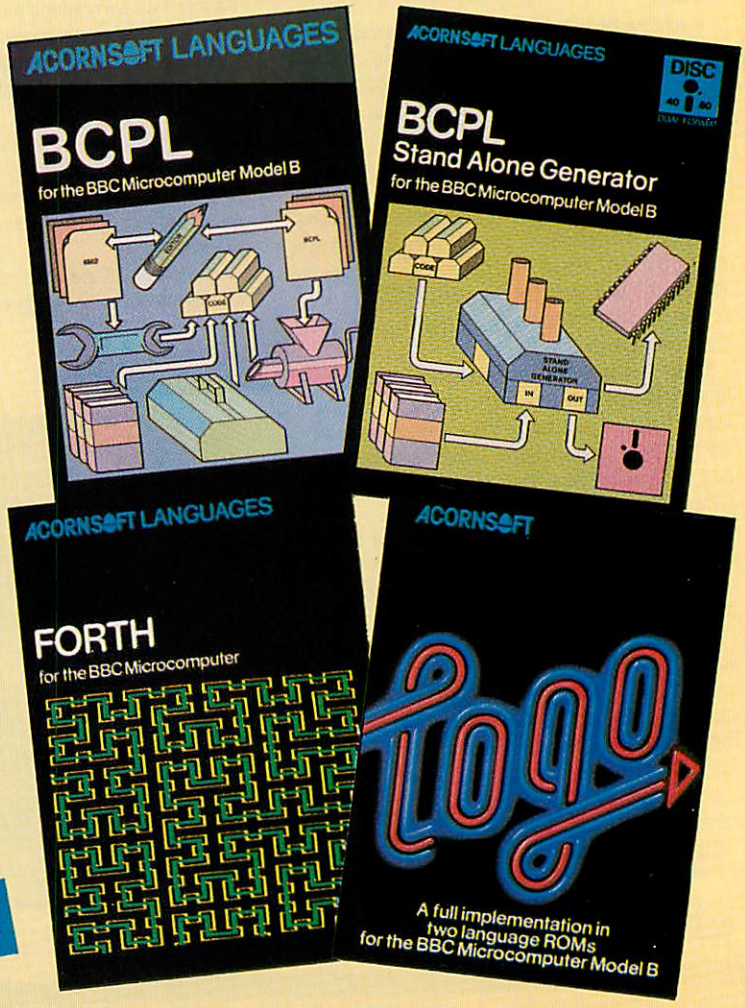

THE MICRO USER MAIL ORDER OFFERS

MUSIC

Make your micro sound sensational!

Creative Sound is a beautifully presented 320 page book, packed with everything you need to know about music on the BBC Micro.

The authors are musician, composer and programmer David Ellis, and Chris Jordan, who designed the BBC Micro's sound system as well as the Acorn Music 500 and 5000.

There are more than 30 program listings, including programmable synthesisers, sequencer, music compiler, example tunes, Mozart's Musical Dice Game, composition aids, pitch trainer, scales program – and sound effects galore.

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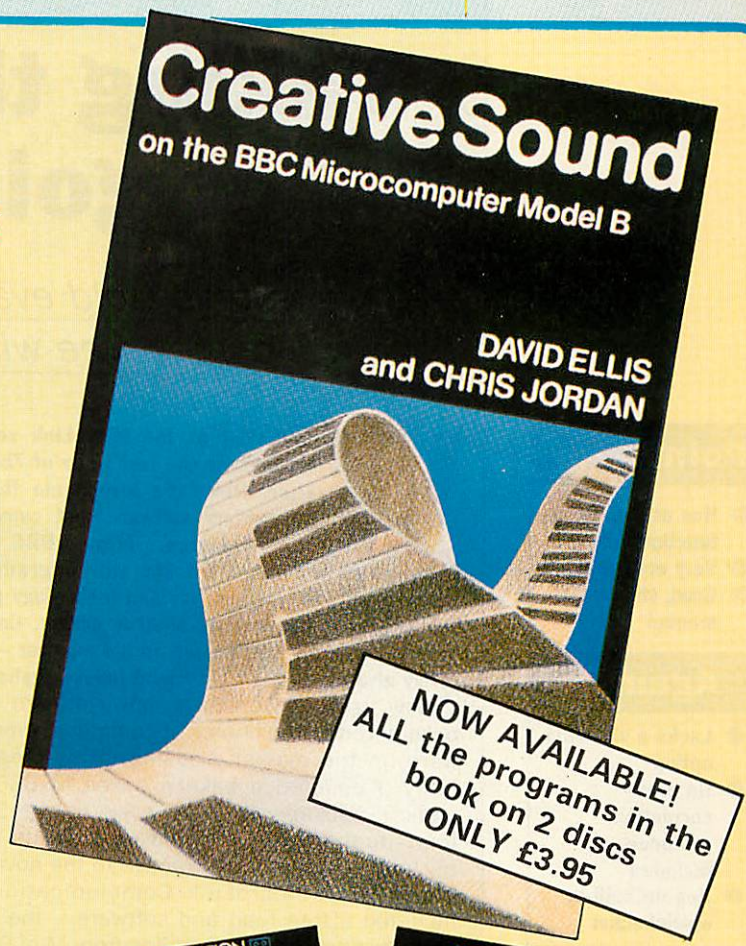

EDUCATION

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- Spooky Manor is an adventure game for up to four players that encourages planning and logical thinking.

- In Talkback you can hold conversations with the computer by typing in sentences – and even create your own computer characters.

- Drill, cut, squash and paint your creations using the machines in the Workshop. Suitable for children from the age of three upwards.

Previously each package cost £9.95 – now you can buy all four tapes together for the same price.

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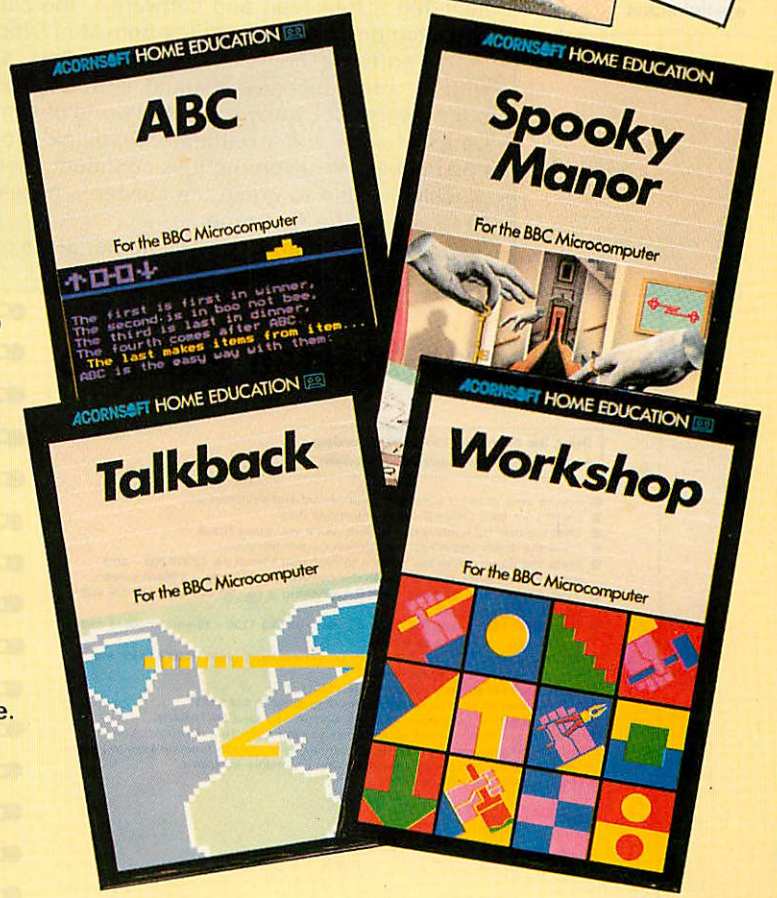
Save £30!



TO ORDER TURN TO THE FORM ON PAGE 151

Taking the chore out of going on line

Steve Gold evaluates the software that comes free with the MicroLink modem

Points for

- Has user-defined function keys
- Very easy to use
- Good, step-by-step manual

Against

- Lacks a viewdata option
- No error-correcting protocols included
- Has no built-in spellchecker

WE looked at the MicroLink series of modems in the last issue of *The Micro User*. Now let's investigate the complementary software that comes with the package. Many BBC Micro communications enthusiasts will upgrade their modems as and when money and technology permits. The software, however, is another matter. Communications software is a bit like an old pullover – people rarely give up on their old friend unless pushed.

New users of modems, however, are usually bewildered by the choice of communications software on the market. Looking in my program library, I counted a baker's dozen of BBC Micro comms packages without even trying. Sensing this situation and, in a bid to make its modem packages even more attractive to the novice BBC Micro user, MicroLink Communications has included a free lead and software – the comms and word processing modules from Mini Office II.

The software comes on a single disc, along with a comprehensive manual – a total of 48 pages which set you out into the world of comms. Coupled with the excellent MicroLink modem documentation, even the less confident user will quickly be able to grasp the concepts necessary to logon for the first time.

Much play is made in the computer press of the complexity of computer communications. It can be a tricky topic to master if you aren't taken through each stage in easy steps, but the manual does this using clear explanations whenever a piece of comms jargon crops up.

Security backups of the software can easily be taken and this was particularly useful in my case, as I was able to download the disc contents to my PMS Ram-disc unit to allow near-instant access to the package. To facilitate making backups of the programs – something which you are encouraged to do in the first few pages of the manual – a copy file is included on the disc. This makes the task that much easier – even for beginners.

Communications in depth

Delving deeper into the comms side of the package, it becomes clear that the manual is aimed at beginners. This means that, unlike many other products, the MicroLink offering includes comprehensive explanations and *what...if* points in its comms section. Although I was initially annoyed by this seemingly pedantic approach, it quickly became clear that comms is not an easy subject for beginners, and the manual's step-by-step approach is, therefore, a very good idea –

A step-by-step guide to accessing MicroLink

Using the MicroLink multi-speed modem or any other Hayes-compatible modem:

- Ensure your modem is correctly connected and switched on.
- Insert your Mini Office II communications disc.
- Boot the disc by holding down Shift while you press Break.
- Press the down arrow key to selection Communications.
- Press the down arrow key twice – to highlight MicroLink 1200/1200 – and press Return twice to take you to the communicate mode – a blank screen.
- Type **AT** followed by Return and if everything is correct the message OK will appear on your screen.
- Press **Shift+f0** to send the dialling code – 01-583 1200 – to your modem and you should hear clicks as it dials.
- When the word CONNECT appears on your screen, press **Return** twice and you should see the prompt PAD>.
- Press **Shift+f1** to send the command CALL 72.
- When asked to sign on, press **Shift+f2** to send ID MAG111.
- When asked for the password press **Shift+f3** to send DATABASE.
- *In a few seconds you will be connected to the MicroLink demonstration mailbox. If you are a MicroLink subscriber, first edit the function keys to your own numbers and then follow the same procedure as above.*
- To leave the system key OFF.

2

Using the MicroLink dual-speed modem or any other manual modem:

- Ensure your modem is correctly connected and switched on.
- Insert your Mini Office II communications disc.
- Boot the disc by holding down Shift while you press Break.
- Press the down arrow key to selection Communications.
- The MicroLink 1200/75 option is highlighted so press **Return** twice to take you to the communicate mode – a blank screen.
- Dial 01-583 1275 on your telephone.
- When you hear the high-pitched whistling tone, press the Connect button on your modem.
- When the carrier detect light comes on, hang up the phone and press **Return** twice and you should see the prompt PAD>.
- Press **Shift+f1** to send the command CALL 72.
- When asked to sign on, press **Shift+f2** to send ID MAG111.
- When asked for the password press **Shift+f3** to send DATABASE.
- *In a few seconds you will be connected to the MicroLink demonstration mailbox. If you are a MicroLink subscriber, first edit the function keys to your own numbers and then follow the same procedure as above.*
- To leave the System key OFF.

The first time you use this software with a MicroLink modem you are advised to access the demo mailbox as described on these pages to ensure that both the software and the modem are working correctly.

3

Sample pages from the MicroLink software manual

one that first-time users of modems will appreciate.

Because the package comes bundled free with the BBC Micro version of the MicroLink modem, most of the practical demonstrations are heavily biased towards the MicroLink electronic mail service. However it would have been nice if the program authors could have acknowledged that there are two terminal emulations in widespread use in the UK – scrolling Ascii, as used by MicroLink and most Email services, and viewdata like Prestel and a few bulletin boards.

Once the comms module has been selected from the menu-driven front end to the software, a series of simple cursor-controlled menu bars step you through a variety of options. At all stages, pressing Escape steps you back to the previous menu. Although the comms menus are set up for the three main MicroLink access speeds – 300/300, 1200/75 and 1200/1200 baud – the package also includes a customisation feature to allow faster or non-standard protocols to be used.

All normal RX/TX – receive and transmit – speeds are supported by this option and they range from the lowly 75 baud right through to 19200. The higher speeds such as 9600 and 19200 baud will probably only prove useful when transferring files or data directly between computers using a null-modem cable.

As well as the normal speed select options from the menu, the comms module allows the modem link to be customised right down to the number of start and stop bits and parity system

The MicroLink modems

used over the communications link. Unusually, the option to enable or disable the software-driven Xon/Xoff protocols is included.

Once the communicate option is selected from the final menu, the screen clears and you are left with a blank Mode 3, 6 or 7 screen – as previously selected from the customisation option. The default display option is Mode 3, a nice 80 column display, but Modes 6 and 7 – 40 column displays – are useful if you use a standard TV set.

Once you are on line, a number of options are available via the BBC Micro's function key set. These include the ability to send or receive files using 7 and 8 bit protocols and a split-screen effect for online chat services. Other options include line-feed and echo toggles for non-standard online services.

There's also a facility to use the function keys to hold your own text – ideal for quick logging on. To do this the keys are defined either by using the usual *KEY command or by entering them using a flexible editor included in the package.

Overall, the features of the comms module are comprehensive but the lack of a viewdata option, as well as error-corrected file transfer protocols – such as X-Modem or Kermit – will be missed by the more advanced comms software user.

Conclusions

The MicroLink software is bundled as a freebie with both the MicroLink modems. As such, it's almost impossible to criticise the package in terms of value for money.

The comms option lacks viewdata and file transfer protocols such as X-Modem or Kermit and the word processor lacks a spellcheck feature. Despite these limitations, the package is ideal for use with most electronic mail services such as MicroLink and other scrolling Ascii ones.

It would be churlish to assume that any novice modem user would feel restricted by the software, since almost all other modems on the market don't even bother to supply any within the overall price. Word processing software is even rarer when it comes to modem bundling deals.

I suspect that most users will welcome the inclusion of this software in the MicroLink modem package. It's free and ready-to-roll with the modem – which also comes with a free subscription to MicroLink. Probably many users, once they become proficient, will upgrade to a fully-fledged comms applications package such as Commstar or Commsoft. These cost up to £30, while the one reviewed here costs nothing.

As my old schoolteacher said: "If it's free, don't knock it". I may have knocked the software on one or two minor points. I don't, however, expect too many buyers to be disappointed, and it adds value to the modem bundle as a whole.

The word processor

The word processor is, an updated version of the module from the original Mini Office II package. It is designed to function as a fully-fledged word processor in its own right, and the usual options of creating, editing and manipulating the text are available. Additional options include the ability to switch between 20, 40 and 80 column modes for display purposes.

When I first saw Mini Office II in 1986 I found the word processing functions more than adequate. Since then, the word processing market has moved on, and we now expect features such as spell checking as standard. Unfortunately, the package doesn't have this feature but this is, I suspect, more of an indictment of the memory limitations of the BBC B rather than on the software producers.

Having said that, it's fairly easy to customise the word processor function to accommodate spell checking packages such as Beebug's Spellcheck Rom or disc.

Since the package's word processor function is intended primarily to act as an adjunct to the communications facility rather than a stand alone WP package, it's perhaps a little over-critical to bemoan the lack of a spellcheck option. It is ideal for its intended purpose – to produce Ascii text files ready to transmit via the comms module.

The bottom line...

The software comes free with the MicroLink modem and makes the bargain even better value for money

One feature of the comms package not seen on the original Mini Office II suite of programs is the MicroLink demonstration facility.

By selecting a set of menu options – using the cursor control bar inherent to the package – you are given an instant online demonstration of MicroLink.

Technicalities aside, this will quickly give you a feel for online communications, without the hassle of logging on manually to a bulletin board – the sound of a perpetually engaged telephone can be very frustrating for the first timer.

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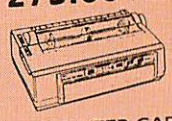

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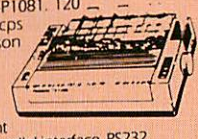

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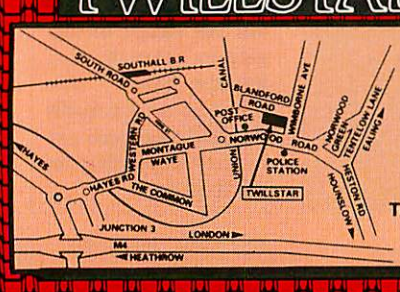

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Cassette inlay designer

Here's a super idea from Oliver Haskell to tidy up your tape collection

CASSETTE inlays supplied with tapes are fine for recording details. But if you change the contents later you're left with the choice of scribbling over the existing entry or producing a new inlay. This program solves the problem by printing clear inlays and labels for your cassettes at a moment's notice, allowing you to update your tapes neatly.

Type it in, ensure you've made no errors using Get it Right! and save it as CassLab. When you run the program you are presented with the Mode 0 screen shown and all the action takes place on this. Instructions are provided in the box at the bottom of the screen.

To select an option or enter data, press the spacebar until the desired position is highlighted, then press Return. The areas you can fill are for performer, album title and track titles for sides 1 and 2.

In the album title area type in the name of the record. In the performer section simply enter the name of the band or composer. The number of characters you have is dependent on the length of the album title already entered, if any. For track titles enter each of a maximum of 14 tracks or required details.

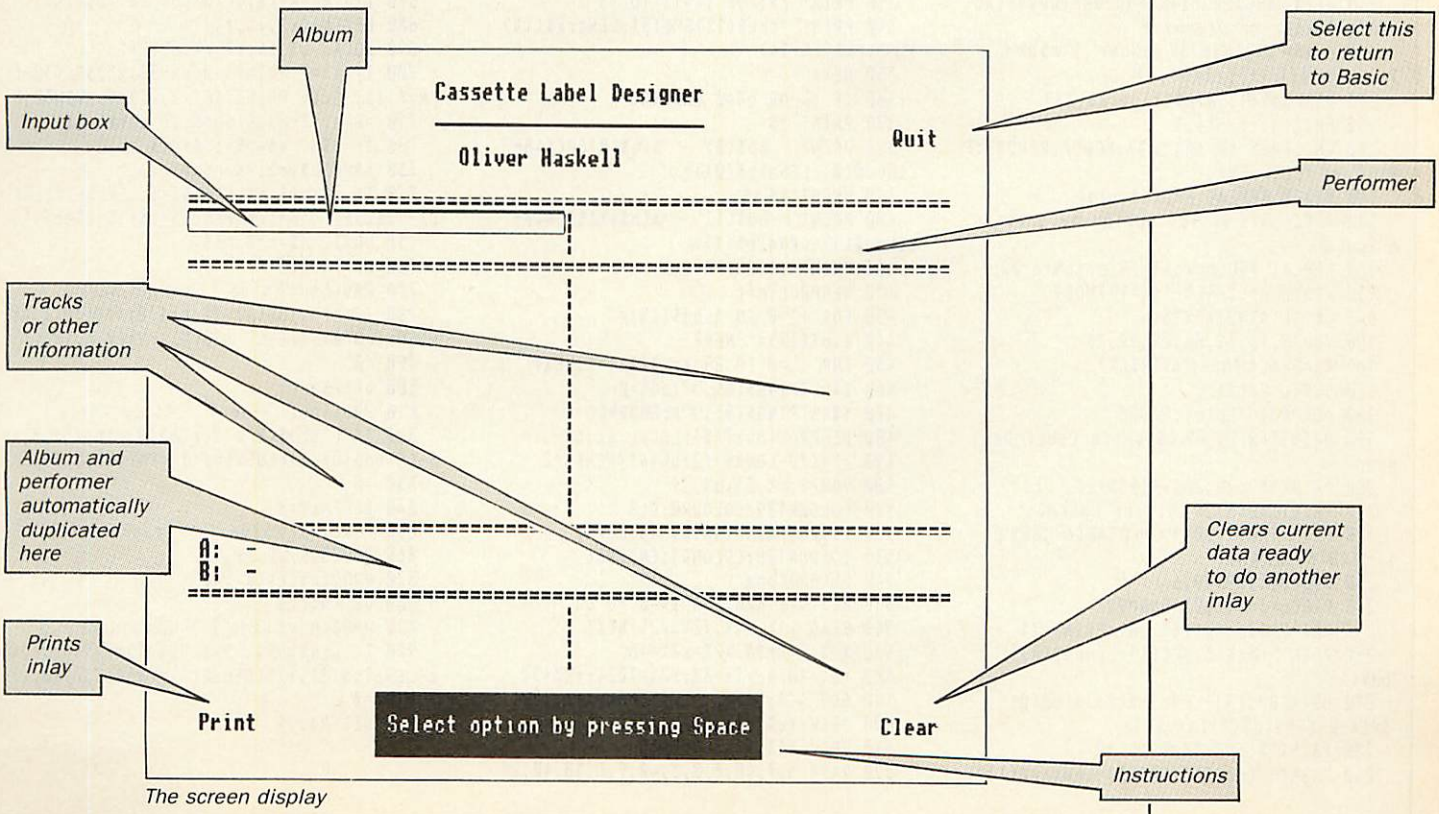
When you print the inlay you are also given the option to print title strips that you can attach direct to the cassette. The micro then asks you to ensure that the printer is on line and the paper correctly positioned, then press the spacebar.

All printing is done in condensed mode on Epson-compatible printers to allow 65 characters across the inlay. Once finished, both it and title strips can be cut out and put in position. The Clear option removes all the data and allows you to start another.

There is a limit of 30 characters on all inputs,

Turn to Page 40 ►

"This program prints clear inlays and labels for your cassettes at a moment's notice"



The screen display

◀ *From Page 39*

although band name and album title cannot both be this length as they would not fit into the cassette title strip: They can only be a maximum of 48 characters combined.

Pressing Escape will exit the input routine and return you to the select option stage. This should be used in the track title stage if you want less than the maximum 14 titles.

Using this program on all your cassettes has the advantage that they will all be uniform, readable and easy to change should you record something else on a tape.

If you are doing several inlays at once, follow the input-print-clear sequence and once all the required inlays have been printed they can all be cut out at once. There should be no need to advance the paper feed on your printer between inlays.

```
============================================================
 THE ROCK'N'ROLL BAND          ¦ BEETHOVEN SYMPHONY NO.2 IN G
          Album No.1, Take 1   ¦           Royal Philharmonic
============================================================
 Long Live Rock'n'Roll         ¦ Allegro
 Hey Hey Rock'n'Roll           ¦ Adagio
 Rock Around The Clock         ¦ Pistachio
 Rock 'Til You Drop            ¦ Pianissimo
 You Can't Stop Rock'n'Roll    ¦ Fortissimo
 Rock'n'Roll Heroes            ¦ Matrediosfortissississimo
 This Isn't Really A Cliche    ¦ That'sallfolksimo
 Rock'n'Roll Somethingorother  ¦
 King Of Rock'n'Roll           ¦ Conducted By A. N. Other
                               ¦
                               ¦
============================================================
 A: THE ROCK'N'ROLL BAND - Album No.1, Take 1
 B: BEETHOVEN SYMPHONY NO.2 IN G - Royal Philharmonic
============================================================
                               ¦ Recorded 12/3/76 At The Royal
                               ¦ Festival Hall On My Personal
                               ¦ Stereo. Genuine Copy!
```

```
=====================================================
¦ THE ROCK'N'ROLL BAND - Album No.1, Take 1          ¦
=====================================================

=====================================================
¦ BEETHOVEN SYMPHONY NO.2 IN G - Royal Philharmonic  ¦
=====================================================
```

A sample inlay and the two corresponding labels

```
   10 REM Cassette label designer
   20 REM by Oliver Haskell
   30 REM (c) The Micro User
   40 cr$=CHR$13:dl$=CHR$127:sp$=CHR$32
   50 alf$="ABCDEFGHIJKLMNOPQRSTUVWXYZab
cdefghijklmnopqrstuvwxyz"
   60 num$="0123456789":pun$=" !""#$%&'(
)=~¦-^\@{{[_++};:]<>?,./"
   70 DIM bd$(1),alb$(1),trk$(28)
   80 PROCinit:*FX4,1
   90 ON ERROR IF ERR<>17 MODE7:REPORT:P
RINT" at ";ERL:END
  100 MODE0:REPEAT PROCdisplay
  110 PROCinst("Select option by pressin
g Space")
  120 REPEAT PROCbox:A%=FNin(sp$+cr$)
  130 PROCbox:C%=(C%-(A%=1))MOD9
  140 UNTIL A%=2:*FX15
  150 VDU28,16,31,66,29,12,26
  160 A%=EVAL("FNact"+STR$C%)
  170 UNTIL FALSE
  180 DEFPROCdisplay:VDU26
  190 PRINTTAB(29,1)"Cassette Label Desi
gner"
  200 PRINTTAB(29,2)STRING$(23,"_")
  210 PRINTTAB(31,4)"Oliver Haskell"
  220 PRINTTAB(9,30)"Print"TAB(67,30)"Cl
ear"TAB(68,3)"Quit"
  230 VDU28,8,29,79,6
  240 PROCprint(1,0):ENDPROC
  250 DEF PROCprint(t%,q%):PRINT Z$
  260 PRINT" "bd$(0)SPC(31-LENbd$(0))"¦
"bd$(1)
  270 PRINTSPC(31-LENalb$(0))alb$(0)" ¦
"SPC(30-LENalb$(1))alb$(1)
  280 PRINTZ$:FOR I%=0 TO 10
  290 PRINT" "trk$(I%)SPC(31-LENtrk$(I%)
)"¦ "trk$(I%+14)
  300 NEXT:PRINT Z$
  310 PRINT" A: "bd$(0)" - "alb$(0)
  320 PRINT" B: "bd$(1)" - "alb$(1)
  330 PRINT Z$:FOR I%=11 TO 13
  340 PRINT" "trk$(I%)SPC(31-LENtrk$(I%)
)"¦ "trk$(I%+14)
  350 NEXT
  360 IF t% OR q%=0 ENDPROC
  370 PRINT Y$
  380 PRINT"¦ "bd$(0)" - "alb$(0)SPC(48-
LENbd$(0)-LENalb$(0))" ¦"
  390 PRINT Y$'Y$
  400 PRINT"¦ "bd$(1)" - "alb$(1)SPC(48-
LENbd$(1)-LENalb$(1))" ¦"
  410 PRINT Y$:ENDPROC
  420 DEFPROCinit
  430 FOR I%=0 TO 1:bd$(I%)=""
  440 alb$(I%)="":NEXT
  450 FOR I%=0 TO 28:trk$(I%)="":NEXT
  460 Z$=STRING$(65,"="):C%=0
  470 Y$=STRING$(55,"="):ENDPROC
  480 DEFPROCinst(A$):LOCAL a%,b%
  490 a%=(79-LENA$)/2:b%=41+LENA$/2
  500 VDU28,a%,31,b%,29
  510 COLOUR129:COLOUR0:CLS
  520 VDU26:PRINTTAB(a%+1,30)A$;
  530 COLOUR128:COLOUR1:ENDPROC
  540 DEFPROCbox
  550 RESTORE 620:FOR I%=0 TO C%
  560 READ x1%,y1%,x2%,y2%:NEXT
  570 X1%=x1%*16:X2%=x2%*16
  580 Y1%=1024-y1%*32:Y2%=1024-y2%*32
  590 GCOL4,0:MOVEX1%,Y1%:DRAWX1%,Y2%
  600 DRAW X2%,Y2%:DRAW X2%,Y1%
  610 DRAW X1%,Y1%:ENDPROC
  620 DATA 8,7,40,8,8,8,40,9,8,10,40,21
  630 DATA 41,7,73,8,41,8,73,9
  640 DATA 41,10,73,21,8,29,15,32
  650 DATA 66,29,73,32,67,2,73,5
  660 DEFFNin(k$):LOCAL I%:REPEAT
  670 I%=INSTR(k$,GET$):UNTIL I%:=I%
  680 DEFFNi(x%,y%,z%,i%)
  690 LOCAL a$,i$,s$,c%:REPEAT
  700 IF i%=2 PRINTTAB(x%-30,y%)SPC(30-L
ENs$)s$; ELSE PRINTTAB(x%,y%)s$;:VDU32,8
  710 a$=alf$+num$+pun$:IF c%=z% a$=""
  720 IF s$>"" a$=a$+cr$+dl$
  730 i$=MID$(a$,FNin(a$),1)
  740 IF i$=dl$ s$=LEFT$(s$,LENs$-1):c%=
c%-1:ELSEIF i$=cr$ ELSEs$=s$+i$:c%=c%+1
  750 UNTIL i$=cr$:=s$
  760 DEFFNact0
  770 PROCinst("Side 1 > Band name")
  780 IF LENalb$(0)>18 bd$(0)=FNi(9,7,48
-LENalb$(0),1)ELSE bd$(0)=FNi(9,7,30,1)
  790 =0
  800 DEFFNact1
  810 PROCinst("Side 1 > Album title")
  820 IF LENbd$(0)>18 alb$(0)=FNi(39,8,4
8-LENbd$(0),2)ELSEalb$(0)=FNi(39,8,30,2)
  830 =0
  840 DEFFNact2
  850 PROCinst("Side 1 > Track titles")
  860 VDU28,9,29,39,10
  870 PROCtracks(0):=0
  880 DEFFNact3
  890 PROCinst("Side 2 > Band name")
  900 IF LENalb$(1)>18 bd$(1)=FNi(42,7,4
8-LENalb$(1),1)ELSEbd$(1)=FNi(42,7,30,1)
  910 =0
  920 DEFFNact4
```

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VINE MICRO REPLAY (State M/C and Disc Interface) £30.00 (e)

NB It is essential to state machine and 40/80T when ordering software

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Archimedes Ref. Manual					£29.95 (d)
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Please state Single or Twin Row, when ordering Labels

◀ From Page 40

```
  930 PROCinst("Side 2 > Album title")
  940 IF LENbd$(1)>18 alb$(1)=FNi(72,8,4
8-LENbd$(1),2)ELSEalb$(1)=FNi(72,8,30,2)
  950 =0
  960 DEFFNact5
  970 PROCinst("Side 2 > Track titles")
  980 VDU28,42,29,79,10
  990 PROCtracks(14):=0
 1000 DEFFNact6
 1010 PROCinst("Do you want cassette tit
le strip? (Y/N)")
 1020 Q%=FNyn:CLS
 1030 PROCinst("Check printer then press
 Space")
 1040 A%=FNin(" "):CLS
 1050 PROCinst("Printing..."):*FX3,10
 1060 VDU27,15:PROCprint(0,Q%):*FX3
 1070 =0
 1080 DEFFNact7
 1090 IF FNsure CLS:PROCinit:=0 ELSE=0
 1100 DEFFNact8
 1110 IF FNsure VDU26,12:END ELSE=0
 1120 DEFFNsure
 1130 PROCinst("Are you sure? (Y/N)")
 1140 =FNyn
 1150 DEFFNyn:=FNin("YyNn")<3
 1160 DEFPROCtracks(v%)
 1170 LOCAL y%:FOR I%=v% TO v%+13
 1180 y%=I%MOD14:IF y%>10 y%=y%+4
 1190 trk$(I%)=FNi(0,y%,30,1)
 1200 NEXT:ENDPROC
```

Get it right!

```
 10 =    0 0      310 = FE56 2      610 = AA65 4      910 = 459A F
 20 =    0 0      320 =   6E 9      620 = 6B53 0      920 = 1682 0
 30 =    0 0      330 = 48C0 8      630 = 33E2 C      930 = 95DD 6
 40 = 223D D      340 = 47E6 6      640 = 7A1E B      940 =  925 C
 50 = 3C30 A      350 = 2C83 B      650 = 9598 3      950 = 459A C
 60 = 1C09 5      360 = 5C02 6      660 = 2418 A      960 =  6A3 2
 70 = 61F9 3      370 = BFFE B      670 = A6D1 F      970 =  E0C 1
 80 =  2A8 0      380 = F96D 7      680 = 112C F      980 = 54A4 E
 90 = 6369 1      390 = 3197 2      690 = 359C F      990 = EE41 8
100 = D3D7 6      400 = 2318 4      700 = A34E 7     1000 = 36C0 7
110 = B4A7 0      410 =  7B3 9      710 = B033 6     1010 = ABEB 7
120 = FBD3 5      420 = 344C 6      720 = C28F 0     1020 = F86B 3
130 = DB9D 2      430 = D718 C      730 = 5067 C     1030 = F941 6
140 = 7C77 6      440 = DFCB C      740 = 36F1 E     1040 = EBB7 E
150 = 8485 B      450 = 99C3 1      750 =  A7C 5     1050 = B343 C
160 = D425 5      460 = 4BA6 6      760 = 5606 2     1060 = CF91 E
170 = 226C 2      470 = 6938 F      770 = 1710 C     1070 = 459A A
180 = CEDA 9      480 = FB41 8      780 = 8E1E B     1080 = 26E1 3
190 = BEB4 6      490 = E9E0 B      790 = 459A 3     1090 = 3B0D A
200 = D4AC 4      500 = 36DA 4      800 = 4627 A     1100 = D70E 3
210 = A12C E      510 = D122 D      810 = A4FB A     1110 = 8285 E
220 =  A43 6      520 = 1CFD D      820 = EE89 D     1120 = F1FC E
230 = 86B9 3      530 = 34AB D      830 = 459A 7     1130 = A57A 2
240 = BCD6 8      540 = 753D F      840 = 7644 2     1140 = 4B9A 0
250 = DDBE C      550 = A1C6 0      850 =  E7E 5     1150 = C235 5
260 = A244 A      560 = 8230 A      860 =  1C9 0     1160 = 825B 5
270 = F1F6 F      570 = 8F8F 1      870 = 8D8B E     1170 = 62F8 8
280 = 7152 9      580 = 8BB1 B      880 = 6665 1     1180 = D632 7
290 = 47E6 E      590 = B044 2      890 = F435 0     1190 = 7E58 3
300 = 6596 A      600 = C0B2 7      900 = 61A0 A     1200 = E531 7
```


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Ceefax Guide

B B+ M

Software is currently transmitted for a period of one week. The teachers' notes for the TV series Issues *are transmitted from Wednesday to the following Tuesday and all other files are updated on Fridays. There will be periods during the update day when the files are unavailable. The program details given are provisional.*

May 6 to 12

T/OSB25
B/OSB25

Osbits is a 26-part course to help you understand BBC Micro assembler language. Module 25 studies *legal* and *illegal* code. Acorn as made a very wide range of routines available to the machine code programmer and using these is the legal method of achieving the desired result, although accessing specific parts of the memory map directly can sometimes be faster. The use of legal and illegal coding is described in the text file T/OSB25, with an example program B/OSB25.

B/Ship
B–Ships

This is the traditional game of Battleships on the BBC Micro screen. Play against the micro or an opponent.

Alph
PS/Info
Indel
WDF
SetUp

A database specifically written to help disc users keep track of the type and content of all the files held on an assortment of discs. A comprehensive information file is included to help you.

MakHis
Scene

Notes for teachers making use of the BBC Education programmes Making History and Scene.

DiscCpy

A useful disc copying utility from the January 1986 issue of *The Micro User*. It allows you to either copy several files using one command or copy a file and give it a different name on the destination disc.

May 13 to 19

T/OSB26
B/OSB26

The concluding module of the Osbits guide to assembler language programming. It deals with techniques of editing a source code file.

U/Ind
MakHis
Scene
AlevB
AlevH
BSH

Teachers' notes to the BBC Educational broadcasts Understanding Industry, Making History, Scene, A-Level Studies: Biology, A-Level Studies: History and British Social History.

Banners
BanDoc

Produce any size of text on your Epson-compatible printer with this utility. Banners will allow you to create posters and textual displays with huge characters printed out on a normal printer.

PSquare
Psquare2

An intriguing game to stretch your powers of skill and judgement and keep your mind sharp!

TextRd

Several of the transmitted telesoftware files consist of text only. They can't be CHAINed or *RUN, but require a *TYPE command to display them on the screen. This – or *PRINT on the Master – doesn't do the job in an ideal way and is not available if you haven't got a DFS fitted. TextRd provides a versatile alternative method of reading and/or printing not only the telesoftware text files but also any other Ascii files you may have.

Phobia

Claustrophobia is a fascinating maze game from the January 1986 issue of *The Micro User*. In it you are trapped and must recover as much of your treasure as you can before escaping.

May 20 to 26

K–Print
KeyPrnt

Print your own keystrips for use with the red programmable function keys. Once one has been defined, it can be printed out in any quantity and its data saved to disc for future use. A range of prepared definitions are included with the program.

Photos
Safety
OtherCh
MakHis
Scene
A-LevH
A-LevB
BSH

Notes to accompany the BBC Education programmes Photography, Safety First, Looking After Other People's Children, Making History, Scene, A-Level Studies: History, A-Level Studies: Biology, and British Social History.

VidiEd

The ultimate in Mode 7 teletext screen design system. This is the software used by Ceefax to create its entire magazine. Communications protocols are also offered for those with Acorn Prestel adapters and access to the Prestel computer on an *Information Provider* level.

TTex
Dump7

TTex will automatically print or save to file any number of Ceefax pages you may care to select. Simply enter the numbers of all the pages you wish to capture. The printouts can be in any of a range of shapes and sizes, and can include pages previously saved to disc.

4-site

4-site is a game similar to noughts and crosses except that the object is to get four counters in a row in three dimensions using four levels. It first appeared in the May 1986 issue of *The Micro User*.

May 27 to June 2

Dice
Dice2

An interesting dice game implemented on the BBC Micro. Roll the dice in search of elusive configurations – with the computer keeping score.

ShareInf
Main
Entry
Analyse
Plot
Auto
Acc0
Acc1
Acc2

A Ceefax-interactive suite of programs to keep track of your own personal portfolio of shares. Because the routines use the actual share data from the Ceefax transmissions, the program will show your share status accurate to within a few hours.

Scene
A-LevB
A-LevH
BSH

Notes for teachers using the TV and radio programmes Scene, A-Level Studies: Biology, A-Level Studies: History, and British Social History.

Poster

In Poster Puzzle you are presented with a mixed-up poster in the form of a sliding block puzzle. Your task is to sort it out. The program first appeared in the March 1986 issue of *The Micro User*.

B B+ Master Compact A

Monkeying around with the banana problem...

John Ashurst continues his series on programming in Prolog

Prolog stands for PROgramming LOGic and was first implemented in 1972 in Marseilles by Colmerauer and Roussell. It was designed to get away from machine procedure and move towards human logic to give a language that can be applied to almost any situation.

WE looked last month at the basics of Prolog. So this time let's look at something which gives a hint of its artificial intelligence applications: This is the problem of the monkey, the box and the banana. A banana is suspended in the middle of a room. A box is by the window and a monkey stands by the door.

Clearly, it would not detain a reasonably bright monkey long to see that it must push the box to the middle, climb on and reach the banana. But how do we program a computer to solve the problem? With Prolog, it is surprisingly easy. We will express the current state of affairs using a list called *state*:

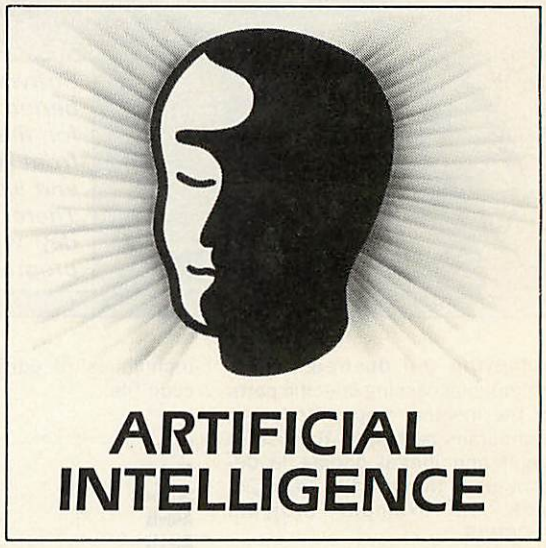
```
(state (X Y Z x))
```

Each term tells us something about how things are positioned in the room. The first term refers to the monkey's position. The second is whether the monkey is on the box – *onbox* – or on the floor – *onfloor*.

Next comes the position of the box in the room, and finally whether the monkey has got the banana – *has* or *hasnot*. At the start we have this situation:

```
(state (bydoor onfloor
 bywindow hasnot))
```

In order to progress from one state to another, we need some *move* clauses. These consist of a first state, a move, and the new state. For example the following clause:




```
((move (state (X onfloor Y Z))
 (walk X x) (state (x onfloor Y Z))))
```

shows that if the monkey walks from X to x then the first term of the state changes but everything else remains the same. The clause:

```
((move (state (X onfloor X Y))
 (push X Z) (state (Z onfloor Z Y))))
```

allows the monkey to move the box around. Not surprisingly, it and the box have to be in the same place as each other both at the beginning and the end of this move. Also:

```
((move (state (X onfloor X Y))
 (climb) (state (X onbox X Y))))
```

states that at any point where they are together, the monkey can climb on the box. Clearly, using a conventional language, this might be tricky, as you would have to get the monkey back down off the box if it failed to reach the the banana. Prolog takes care of this automatically with *backtracking* – which we'll discuss further later.

Once we have everything in the right place, the

ERROR MESSAGES

Error	Message
2	There are no clauses defined for the relation queried. It could be a spelling mistake or you have forgotten to provide a relation.
3	Usually means you have called a built-in program with the wrong number of arguments.

The number which appears from time to time at the start of a line is not an error message, but the number of brackets required to complete the clause. Adding too many will cause a syntax error.

monkey can grasp the banana:

```
((move (state (middle onbox middle
 hasnot)) (grasp) (state (middle
 onbox middle has))))
```

The calls to *climb*, *walk* and so on, have to succeed so we must add clauses for them:

```
((climb))
((grasp))
((walk X Y))
((push X Y))
```

which don't actually do anything, they just make the move clauses more readable.

Finally, we need a clause to drive the whole search process along. This will involve recursion – it will call itself repeatedly until the goal has been satisfied:

```
((try X)
  (move X Y Z)
  (PP Z)
  (try Z))
```

In this clause *X* is the initial state, and a call to move will change the state to *Z*. We print the new state to keep check of what is going on, then *try* calls itself with the new state.

The final – terminating – clause must be inserted before this one or it will never be reached:

```
((try (state (X Y Z has)))
  (PP Final state was X Y Z has)
  (PP What a tasty banana.))
```

Similarly, the move clauses have to be in such an order that the ones which involve the most conditions being satisfied are tested for first as shown in the listing. Otherwise, the monkey could go on walking or pushing ad infinitum. As it is it means the monkey gradually approaches the goal.

To initiate the problem solving enter:

```
?((try (state (bydoor onfloor
 bywindow hasnot))))
```

To understand what happens, we'll number the move clauses one to four. Now, because *bydoor* and *bywindow* are different, move four is the only clause which can operate at the start.

This causes the monkey's position to become unspecified – which is quite acceptable. Now move two can operate and the monkey climbs the box. However, the box position is *bywindow* and the monkey can't grasp the banana because clause one requires the position to be *middle*.

This call fails, and Prolog backtracks to the last position where progress is not barred. That is, it tries the remaining move clauses. Of course, clause three can operate and the monkey pushes the box. Now, the positions of both monkey and box are floating and the climb this time allows clause one to assume these positions to middle. At last, all conditions are satisfied and the monkey gets the banana.

● *Although this problem is only simple, it demonstrates the ability of Prolog to solve otherwise difficult ones. Next month we'll look at building user modules.*

INITIALISING MICRO PROLOG

BBC B and B+:

- Switch micro off
- Insert Prolog chip in one of the sockets under the keyboard or top left for B+
- Switch micro on
- Type *Prolog and the & prompt should be displayed

BBC B with sideways ram:

- Put Prolog utilities disc in drive 0
- Type *Prolog to load the language into ram – or whatever command is appropriate for your system
- Press Break
- Type *Prolog a second time to start

BBC Master and B+128:

- Put Prolog utilities disc in drive 0
- Type *SRLOAD Prolog 8000 7 Q
- Press Control+Break
- Type *Prolog to start

SUMMARY OF CLAUSES MET SO FAR

PP	Pretty print
?	Query
FORALL	Find all occurrences
LIST ALL	Display all clauses
LIST <clause>	Display all variants of the specified clause
EQ X Y	Tests if X = Y or assigns Y to the value of X
NOT	Is true if the following clause is false
ED <clause n>	Edit a clause at position n
ADDCL <clause n >	Add clause at position n
DELCL <clause n >	Delete clause at position n
LOAD	Get a session from disc or tape
SAVE	Put a session to disc or tape
***"<star command>"**	Issue a star command

To add clauses, they must be enclosed in double brackets. To query the system, type ? followed by a clause. If the proof fails a ? will be printed, otherwise nothing, leaving you free to arrange a printed response if required.

```
((try (state (X Y Z has)))
  (PP Final state was X Y Z has)
  (PP What a tasty banana.))
((try X)
  (move X Y Z)
  (PP Z)
  (try Z))

((climb))
((grasp))
((walk X Y))
((push X Y))

((move (state (middle onbox middle hasnot))
  (grasp)
  (state (middle onbox middle has))))
((move (state (X onfloor X Y))
  (climb)
  (state (X onbox X Y))))
((move (state (X onfloor X Y))
  (push X Z)
  (state (Z onfloor Z Y))))
((move (state (X onfloor Y Z))
  (walk X x)
  (state x onfloor Y Z))))
```

The monkey's solution – a Prolog listing

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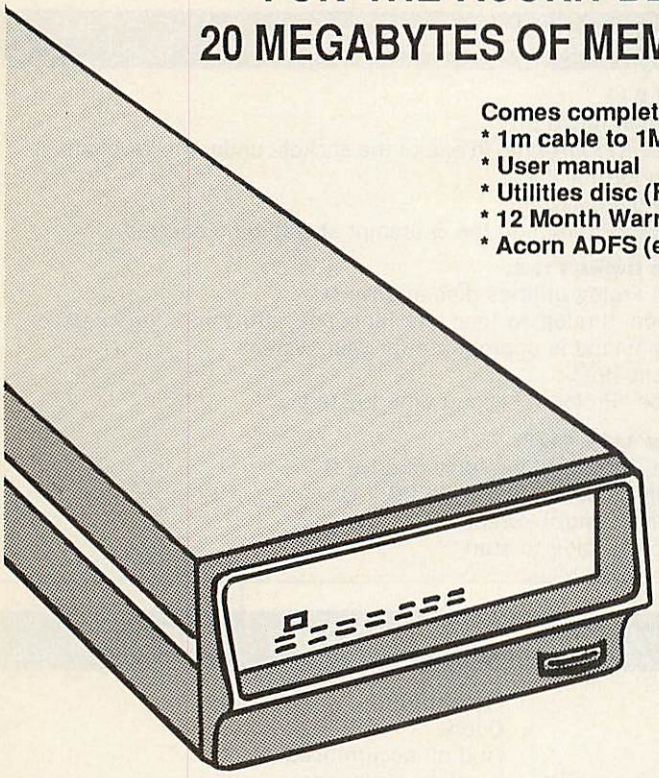

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Your technical questions answered by MIKE COOK

PROBLEM SOLVED

User port pinout

I AM hoping to do a project using the user port on my BBC Micro. Can you please give me a brief outline of what the pins are for and how to read them? – **Ian Hambelton, Worcester Park, Surrey.**

● *I have covered the user port as an input many times in Body Building articles: The most recent was in the January 1988 issue where I looked at the way to read magnetic reed switches. The pinout is given in the back of the User Guide and there's also a program to continuously monitor and display all the input lines there.*

However, in order to make working with the port simple, many years ago I designed a transition board as Body Build pack No.1. This simply plugs into it via a ribbon cable – Body Build pack No. 2 – and has a labelled screw connector block allowing easy access to any signal. The packs are still available from Musbury Consultants priced £9.99 for pack 1 and £8.99 for pack 2.

Fighting flicker

WHY is it that the Commodore Amiga can use its hi-res 640 x 480 – 640 x 512 in overscan/PAL – mode on a normal Philips medium resolution monitor with little or no flickering?

On the Acorn Archimedes, to use the equivalent resolution mode, you have to buy an expensive multi-sync monitor.

If it is possible to display the hi-res modes on the Archimedes on a normal monitor could you please advise me of an interface of some sort which could be made or bought to enable me to do it? – **Zaffar Iqbal, Tinsley, Sheffield.**

● *The high-resolution modes on the Archimedes currently require a multi-sync monitor, but it is possible to simulate them on an ordinary one in software using an interlaced scan. The current operating system – Arthur 1.2 – does not do this but Acorn says that a future operating system might. At the moment no one is producing a suitable software patch.*

There is nothing that could be done in hardware that would be cheaper than buying several multi-sync monitors. Emulating the hi-res modes in software will not be as good as the multi-sync monitor because using interlacing each complete frame is updated every 1/25th of a second instead of every 1/50th. This results in flickering – the amount will depend on the persistence of the phosphor in the monitor, the ambient lighting conditions and the flicker response of your own eye. Some people are more prone to seeing it than others.

Cassette deck control

BBC Enterprises recommends that I write to you for advice on how to obtain or make an interface which will enable a student, at a reasonable cost, to use what is now called Audio Enhanced CAL – Computer Assisted Learning. It must permit a computer program to make the cassette deck play, stop, record and fast forward or rewind to a given point on the tape.

Our problem has two parts. Firstly, to get the tape to fast forward or rewind to the correct place we must feed the output from a digital tape counter to the micro. The ability to branch to any given location on the tape is very important for teaching purposes.

The second part of the problem is designing the rest of the interface or finding an existing one to do the job with the selected cassette deck. Tandberg makes a machine to do what I want, but it costs £600 and other machines – used mainly for monitoring radio signals for intelligence work – I have found are even more expensive. As a magazine supporting the BBC Micro can you help? – **Peter Scott, Al-Raas, Kuwait.**

● *You have one of those problems that sounds perfectly simple but is actually quite difficult – if not impossible. To be able to move the tape to a specified point is very difficult and doing it accurately by means of a tape counter is impossible. This only gives a rough indication and does not give a linear response throughout the length of the tape. Also it would give different readings on different tapes and decks and is normally a mechanical device so has no output suitable for a micro.*

The only reliable method is to record a clock track on the other channel of a stereo deck but it must be capable of reading this during fast for-

Turn to Page 48 ►

On the agenda...

- Using the user port
- Hi-res on an Archimedes
- Software control for tapes
- DFS/ADFS compatibility
- Compact upgrade to 5.25 in discs
- More colours on a BBC Micro
- Fitting two DFSs at once

◀ From Page 47

ward and rewind conditions. This puts severe constraints on the specification of both the deck and tape. From what I know the tape deck at £600 is quite reasonably priced if it will do what you want: It would take a good deal of research and development time to implement a cheaper system.

DFS for droids

RECENTLY I bought a single 400k disc drive, ADFS and Wordwise for my BBC Micro. After fitting them myself, the disc drive would boot the utilities disc perfectly, format, verify load and save my work on Wordwise. But when it came to loading and booting games discs like Codename:Droid it gave me an error: *Disc error at drive 0:0/000050.*

The disc filing system I bought was fitted correctly, as it ran the utilities, and the games disc was not at fault as it loaded perfectly on a friend's BBC Micro with an 8271 DFS. – **Simon Pang, Hanwell.**

● *Codename:Droid is in the DFS disc format and you are trying to run it using ADFS. If you want to run games on your micro it would be wise to fit a DFS, as most games are in that format.*

Port expander

I HAVE a copy of *The Micro User* – August 1984 – which describes a port expander that plugs into the 1MHz bus. Could you please let me know where I can get this kit (pack 17)? – **M.S. Bradshaw, Leicester.**

● *Unfortunately the kit is no longer available as all the printed circuit boards have been sold and demand is such that it is not worth getting them re-made. However, there is nothing to stop you constructing the circuit yourself on veroboard – that's how I made the original prototype.*

Compact drives

I HAVE a Master Compact and was wondering if it is possible to upgrade so it will take a 5.25in disc drive as well as the 3.5in one, so I could run the old BBC Micro programs.

Also is it possible to use a cassette machine, and where would I plug it in? – **P. Byrriman, London.**

● *It is not possible to run cassettes with the Master Compact. As to disc drives, you can fit a 5.25in one by getting the appropriate lead but*

remember it usually works with the ADFS. This means that to read any program stored under the old DFS system you'll have to load the DFS into sideways ram. Also, as it is essentially a different computer, not all games will run on the Compact.

Gaining more colour

I HAVE heard of a technique called palette switching to allow more colours to be displayed in Modes 1, 4 and 5. To my knowledge it's used in Stryker's Run and I think it has something to do with locations around &FE09 which contain the colour palette.

Could you please supply the code, as it would be an invaluable tool for anyone who wants to design screens or games that need those extra few colours? – **M. Watling (Age 14), Northampton.**

● *You can get more colours on the BBC Micro screen by two methods: One is dithering where you put patterns or pixels together to make a different shade and the other is palette switching where part-way down the screen you switch the colours that are being displayed. This is the electronic equivalent of putting strips of coloured filter across your monitor.*

*What you need to do is intercept the frame sync pulse event and set up your colours for the first half of the screen and start a timer in the VIA. When this times out it has to cause an interrupt and a service routine changes the colours of the palette using a *FX115 or a VDU 19 call.*

Alternatively you can write directly to the ULA's palette register at &FE21 – see the Advanced User Guide for further details. The memory locations you mentioned have nothing to do with the palette as they control the serial interface.

Dithering was covered in the April 1985 issue of The Micro User *on page 64 and palette switching was demonstrated in the October 1984 issue on page 51.*

Doubled-up DFS

I HAVE a Watford 1.44 DFS and, although I find it better than my Acorn one, not all of the games which I have will work. Is it possible to install both roms at once? – **Mr. G. Keogh, Lewes, East Sussex.**

● *You can fit two DFSs in one machine but they will both take some private memory – raising Page – and the one in the highest priority socket will take control when you reset the system. Regardless of socket, if you hold the W key down during a control break you will get the Watford system and to get the Acorn one you need to hold down the D key.*

Have you any hardware problems with your BBC Micro? If so, write to Mike Cook, The Micro User, Europa House, Adlington Park, Adlington, Macclesfield SK10 4NP, giving full details of your system and the problem.

Unfortunately, Mike cannot send you personal replies, but as many questions as possible will be answered on the pages of The Micro User.

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Getting down to graphics

Dave Mortimer presents a pixel editor controlled by mouse

IN the November 1987 issue of *The Micro User*, we published a pixel editor for any graphics mode on the BBC Micro. Now to complement it an Archimedes editor for any screen is included on this month's 3.5 in program disc.

The pixel editor has three modes of operation – area selection which allows you to specify which part of the screen is displayed in the edit window, edit mode to change individual pixels and colour selection.

With the exception of specifying filenames, the program is completely mouse-driven. When run, the pixel editor requests the name of the SCREENSAVEd file to be loaded. You then enter the area selection mode – Figure I shows what effects the mouse and buttons produce. Where a button press is marked *single*, one click is needed, *double* means perform two clicks in rapid succession.

When you enter edit mode a colour selection window appears and the bottom left pixel in the edit window is boxed. The controls for this mode are shown in Figure II and allow you to select a pixel – called the active pixel – and to alter its colour to the one currently boxed in the colour selection window. By double clicking the left button you can also set the active colour as that of the active pixel.

In colour selection mode you can either move around the grid with the mouse and select a colour using the middle button (at which point you move directly back to edit mode) or you can use the left button to set the colour of the active pixel – the one you were editing – as the active colour. You can then return to edit mode with the right-hand button.

Control	Effect
Mouse movement	Change the area being magnified
Left button	Toggle edit mode on/off
Middle button (single)	Increase magnification
Middle button (double)	Decrease magnification
Right button (single)	Toggle edit grid on/off
Right button (double)	Quit from pixel editor

Figure I: Summary of control effects for area selection mode

Control	Effect
Mouse movement	Select active pixel
Left button (single)	Quit to area selection mode
Left button (double)	Select colour of active pixel as active colour
Middle button	Set pixel to active colour
Right button	Enter colour selection mode

Figure II: Summary of control effects for edit mode

How it works

The program is built around a multi-mode ARM code magnify routine, designed to be as flexible as possible, allowing a variable level of magnification, variable size of area to be magnified and screen mode determined by the input parameter block.

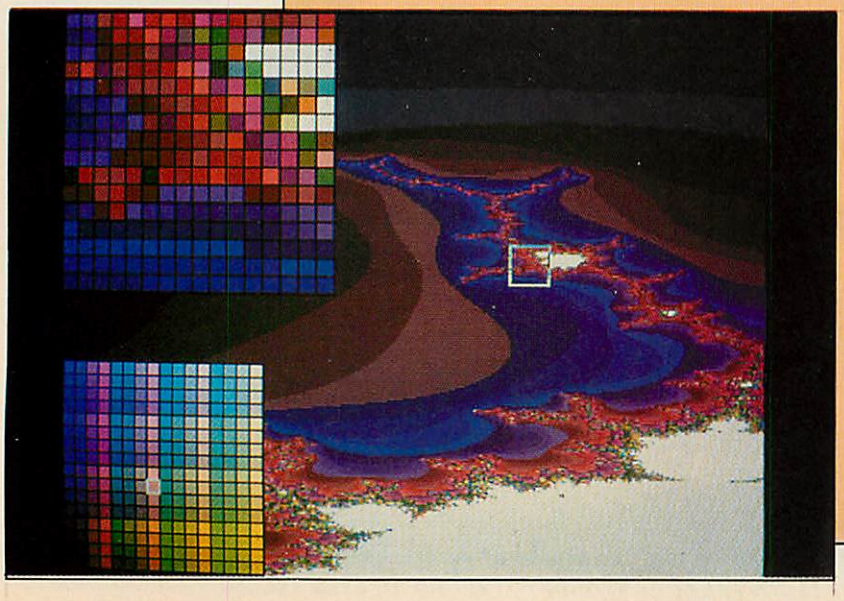
The algorithm works by treating the screen as a serial bit stream, which greatly simplifies the problems associated with providing the flexibility outlined above.

Fortunately the memory map of an Archimedes screen is much simpler than that of the BBC B – the bits determining the colour of any pixel are adjacent to each other and each line of the screen appears sequentially in memory.

The algorithm works like this: The routine starts from the left hand edge and moves across the screen. It first reads in the bits representing a single pixel then by a series of shifts and logical ORs it builds up a magnified image of the pixel, which is then placed back on the screen at the appropriate place.

For reasons of efficiency the program works in

Pixel Editor in 256 colour mode



larger chunks, but the idea remains the same although it is slightly more complex when the other features are added.

The rest of the program is really just a shell which allows the magnify routine to be used to edit a picture.

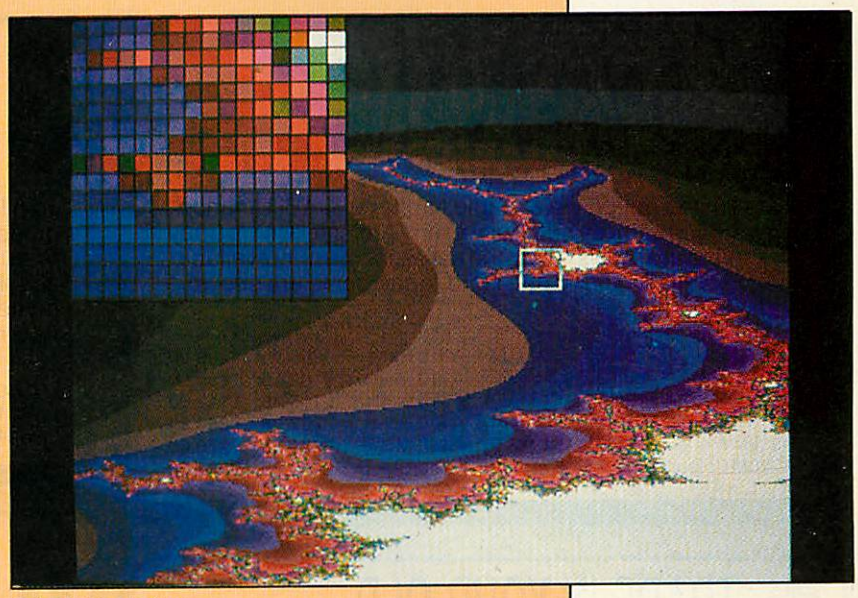
PROCmagnify lets you to move the magnified area around the screen. It also includes the code for toggling the grid and altering the magnification factor across four possible values – 2, 4, 8 and 16.

The routine can cope with almost any magnification, but on higher levels the size of the displayed area changes, giving a displeasing effect.

Editing is controlled by PROCedit. It also displays the palette of available colours in which the selected colour is highlighted. This palette is actually a sprite which is drawn initially by PROCshowpal and then saved. The areas of screen overlayed by windows are also first saved as sprites so that they can be placed back on screen quickly and easily.

Control	Effect
Mouse movement	Select colour to be made active
Left button	Select colour of active pixel
Middle button	Select colour boxed and return to edit mode
Right button	Return to edit mode

Figure III: Summary of control effects for colour selection mode



Selecting a colour

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Archimedes SOFTWARE

More art for Archimedes

Steve Turnbull examines a complement to the Artisan package

HARD on the heels of Artisan, the excellent Archimedes art software from Clares Micro Supplies, comes a disc of goodies to help you make the most of your creations. The Artisan Support Disc 1 is not really a single product, it is three groups of utilities driven from an icon menu screen available via Shift+Break.

The first group contains a set of printer dump programs for a variety of machines – listed on the right – which allows you to store a picture in the reserve screen area then display or print it when needed.

The dump available for the Integrex printer is even better than before using the correct palette colours – whether or not you've changed them from the default settings – and a double density format giving much stronger colours. A small random element has been built into the dump program which actually produces a far better image than the dump supplied with Artisan.

The black and white dumps have a built-in set of shadings and a pattern editor is supplied so that you can design your own shades to match the colours being printed. Each Epson printer dump will work on any compatible colour dot matrix printer such as the JX80 or Star LC10 Colour.

The second icon invokes the Fade designer which creates sequences of fades between two Mode 12 screens. Fades are held in blocks of eight and each covers one quarter of the screen. When used it is mirrored to produce the same effect on the other quarters – thus you can only produce symmetrical fades.

In the editor you can play through your fade, step backwards or edit in order to produce exactly the effect you desire. Included on the disc is a software display module designed to display Mode 12 screens from disc, rapidly fading from one screen to the next.

Fade files can be loaded into the display module and features such as speed of fade and delay between fades can be controlled via star

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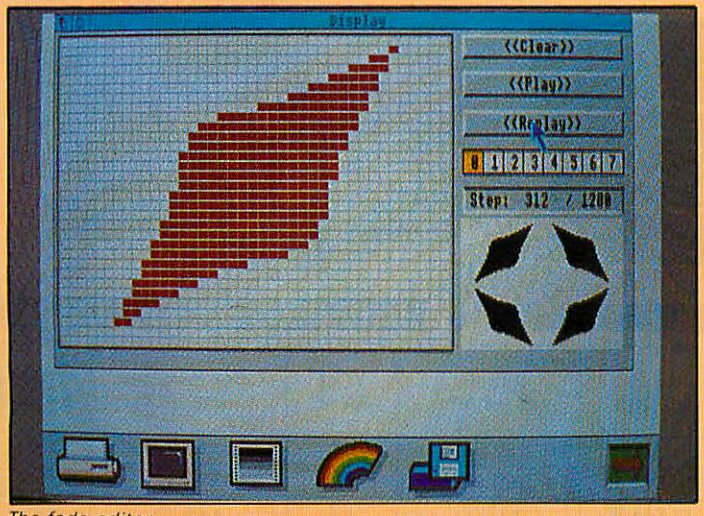
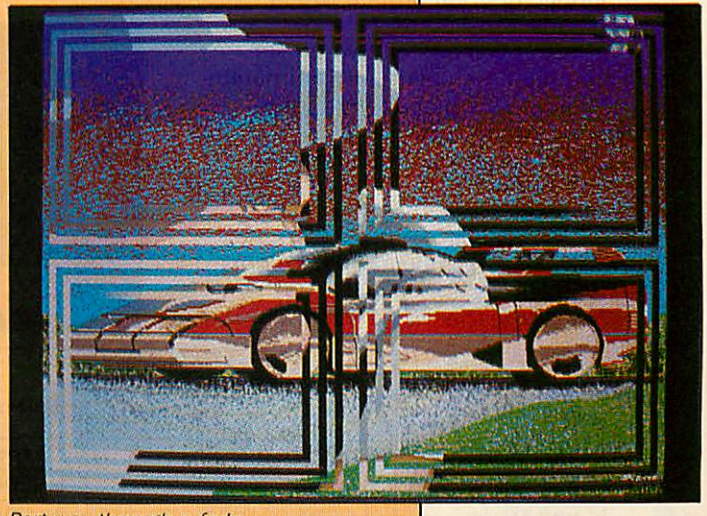
Printers supported

Integrex HQ
Integrex
Epson RXMono
Epson FXMono
Epson Colour 1
Epson Colour 2



The fade editor



Part way through a fade

◀ *From Page 53*

commands. You can specify which file to show and with which fade, or using the:

```
*DISPLAY DISC
```

command make the module select each Mode 12 screen in turn from the current disc directory and display it using each fade in turn. Using this command makes it possible to produce a superb display sequence very easily.

For advanced use a number of picture frames could be set up and the fade specifically designed to emphasise the educational point. And using a simple Basic program the possibilities for interactive work are endless.

If you are concerned about the speed at which the Archimedes loads and saves screens – don't despair. Whichever of Acorn's programmers designed the SCREENLOAD and SCREENSAVE commands used the single byte file Get and Put routines. Clares' programmers have implemented FASTLOAD and FASTSAVE commands which use the block Get and Put routines to speed up the process by at least a factor of five while retaining the same file structure and complete compatibility.

The Fast software is available on disc as a relocatable module and can be loaded whenever you want it. The documentation also points out that using the Archimedes advanced ALIAS command you can intercept all SCREENLOAD commands and convert them to FASTLOAD requests – likewise with saving.

Back to the main menu icons, the next possibility is the pattern editor for the black and white screen dumps. This is a very simple program but allows you to set up precisely the patterns for the best monochrome colour effects for your artwork.

There is a rainbow Palette icon which brings up a window similar to the Archimedes Desktop palette window. It operates in the same way but doesn't have the border colour adjustment – I found the default colour scheme to be rather difficult to use – with white on cream colours. The palette adjustment is included to allow you to fine tune your pictures before printing.

The next icon is for disc access and permits you to load and save specific file types – Pattern, Fade and Screen – when your choice makes sense.

All in all this is an excellent addition to the Artisan package – but is immensely useful even if you don't use Artisan, since the routines work with any Mode 12 screen. Keep up the good work.

● *Artisan was reviewed in the January 1988 issue of* The Micro User.

Product: Artisan Support Disc 1
Price: £19.95
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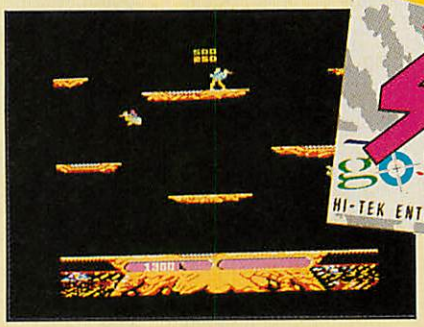
– Hac-Man, The Micro User, March 1988



TO ORDER TURN TO PAGE 151 ▶

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B B+ M

Mastering your BBC Micro

Bruce Goatly assesses a rom to give your Model B a step up in the world and a natty line in notepads

Product: Master Emulation Rom
Price: £14.95 (5.25in disc) £16.95 (3.5in disc) £19.95 (16k rom)
Supplier: Dabs Press, 76 Gardner Road, Prestwich, Manchester, M25 7HU.
Tel: 061-773 2413

THE Master Emulation Rom – MER – from Dabs Press is designed to give users of suitably upgraded Model B and B+ micros access to the advanced features of the Master series, with many new or enhanced filing system commands and various Master-specific facilities. The detail of the emulation extends to the Acorn MOS message and the fact that Break does not change mode on the Master.

Naturally, the more hardware upgrades – such as sideways and shadow ram – you have fitted to your BBC B, the more closely MER will make it resemble a Master – MER can also be disabled to allow Master-incompatible software to run. What MER cannot do is give you Basic 4, 65C02 compatibility, advanced graphics or PAGE set to &E00, and it is not intended to enable you to run Master-enhanced versions of games.

Many of MER's commands concern the Master's extensive use of ram. All the sideways and shadow ram commands have been included. Users without battery-backed ram can still benefit from the *CONFIGURE command by storing the settings on file. *TIME prints a dummy message if no real-time clock is present.

Other MOS commands – for instance *IGNORE, *INSERT, *ROMS and *UNPLUG – are implemented and are useful even on an unexpanded BBC Micro. Extra osbyte and osword calls have been implemented where feasible and are emulated where not – thus osbyte 129, for negative INKEY, maps the Master's numeric keypad sensibly on to the keyboard.

The Master's *SHOW command, to list the contents of the soft keys, is included, as is the */* suffix to *SRLOAD, which allows a rom image to be initialised without pressing Break – previously only available on the Compact.

Two interesting enhancements relate to temporary filing systems and the extension of the library concept to include a filing system different from that currently selected. Any available filing system may be accessed temporarily, without altering the current one, by enclosing its name within hyphens.

The other filing system commands, *APPEND, *CLOSE, *FREE, *MAP and *MOVE – useful in duplicating a file on a disc – are very welcome. Both DFS and ADFS are supported, with disc formatting and verifying commands included, as on the Compact.

MER is understandably rather fussy about which sideways sockets that it and any filing systems should occupy. I also found clashes occurring with otherwise well-behaved roms – ostensibly their fault, not MER's – and some problems with software including SideWriter, which works from sideways ram in socket 15. You may wish to check your rom list with Dabs first, as enhancements continue. Alternatively, *UNPLUG will disable offending roms.

The 50-page documentation is commendably clear and almost free of error, and assumes that the reader understands the Master's capabilities.

Overall this is an impressive piece of software and a very economical way of making your trusty BBC Micro more Master-like, as long as you recognise the limitations of your hardware or are prepared to add – or have already added – upgrades. Even if you have only a disc drive and 16k of sideways ram, the extra commands available from MER make it well worth considering, especially at the price.

The bottom line...

For BBC B owners who want Master facilities, here's a rom that's well worth considering.

Sideways jottings

Product: SideWriter
Price: £7.95 (5.25in disc) £9.95 (3.5in disc)
Supplier: Dabs Press, 76 Gardner Road, Prestwich, Manchester, M25 7HU.
Tel: 061-773 2413

THE idea of a computerised notepad, residing in sideways ram and ready to be called up even from within another program, is not particularly new. The pretext of such a program saving you from having to scrabble around for lost notes on scraps of paper will be familiar whether or not you believe in the paperless office.

Nevertheless, SideWriter from Dabs Press, for users of Master, Compact, B+ and B's with sideways ram, offers a novel feature – a notepad four screens high by four wide, giving you 16 pages on

Turn to Page 56 ►

SIDEWRITER

Pop-up Memo Pad for the BBC Models B/B+ with Sideways RAM, or any Master Series computer.

DABS PRESS

The bottom line...

Ideal if you can never find a piece of paper to jot down your ideas.

◀ *From Page 55*

which to keep notes. The screen acts as a window on to a total typing area of 9525 characters.

Although the disc is marked 40/80T, it is in fact 40-track. The documentation omitted to mention a utility program – Copy40 – on the disc that enables users of non-switchable 80-track drives to copy the contents to a preformatted 80-track disc.

With SideWriter installed into sideways ram, you activate the notepad by pressing the Shift, Control and Tab keys simultaneously. This suspends whatever activity you were involved in, whether word processing, playing a game or debugging a program, and displays a Mode 7 screen headed SideWriter ready for note-taking. Tab on its own returns you to your original task.

Movement around a page is with the cursor keys, and to access the other pages the same keys are used together with Shift – which scrolls your window around the whole notepad – or Control to flick through the pages. The scrolling is very smooth although the auto-repeat speed was rather fast for my liking – the cursor kept whizzing past my target.

You can enter teletext colours directly with the function keys. Unfortunately the instructions did not explain how to do this, apart from a reference to a non-existent illustration.

There are programs on the disc for loading and saving a notepad to and from sideways ram, and for exporting the contents of one to disc as an Ascii file for use with a word processor. This is of limited use because the pages are interwoven in groups of four, giving jumbled text.

Commands within SideWriter include clearing the notepad – there is no double-check on this – and printing the whole pad on an A4 sheet. Some sample notepads are included on the disc.

I found SideWriter very simple and effective in use, with only two real drawbacks. The first was, slightly surprisingly, that the Master Emulation Rom, also from Dabs, interfered with it. I had either to disable MER or to write-protect the sideways ram when pressing Break.

The second problem was less surprising. Quite a few modern programs – largely games – do not allow SideWriter to interrupt them, or return with corrupted screens. Remember, too, that the only way out of some programs is to switch off, which gives you no way of saving the notepad to disc.

If you keep your expectations realistic, SideWriter is a useful and inexpensive way of coping with the interruptions or sudden thoughts to which we are all subject.

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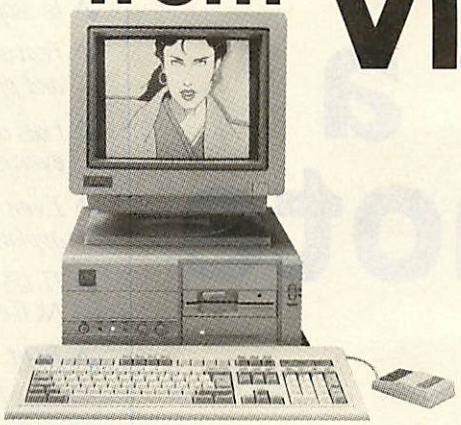

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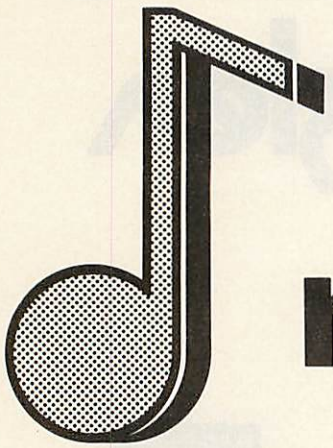

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Overlays with ease

Ray Wilson helps make writing big programs simple

THERE are two types of code in every Basic program: Your tried and tested user-interface procedures – routines to get a number from the keyboard, write an error message on the screen or move a graphic sprite – and the code which applies only to the program you're writing – the record handling part of a database or the "turn your bat into a laser cannon" routine of a game.

The problem is that it gets tedious when you have to type or merge the standard all-purpose routines into the specialised code. And what about your initialisation routine? That only gets used once, but it sits in your program for the rest of the run time taking up valuable space. What is the solution?

It would be possible to CHAIN separate program sections but this loses all your data apart from the system variables. We need program overlays – a set of routines that can be loaded into memory, used and then overlayed by another set when necessary.

There are commercial systems which can do this but they usually require the overlays to be in a special format. The program given here – *With* – can load ordinary programs and execute procedures within them with just a single star command.

Type in the main listing – not the example programs – and ensure you've made no error using Get it Right! Save it as WithSrc and run it. The source program automatically saves the necessary code as With. The utility runs in the RS423 or cassette buffer areas at &900 to &AFF, but can be relocated simply by changing the definition of Q% in line 70. You're now ready to go.

Enter each of the three sample programs: Example, One and Two. Each is independent and can be run on its own, but both Example and One use *With* to load the next program on top as an overlay.

Run the program Example and you should get:

```
ONE -> TWO -> WITH!
```

If you now LIST the program you see you've still only got the program Example in memory. When you run it, *WITH 2 sets aside two pages of memory to store overlays, a couple of variables and then requests jump into a procedure within an overlay. In this, the line:

```
50 *WITH ONE'one
```

means load a file called ONE into the overlay space if it will fit and then perform the call:

```
PROCone
```

It is important to realise that when a program is being used as an overlay only the procedure being called is executed – lines 10 to 60 of program One are not touched at all.

Inside PROCone a few more actions are carried out, then another overlay request occurs:

```
80 IF W% W$=W$+"I":*WITH two(W$)
```

This form of the *With* command assumes that the filename is the same as the procedure name. So TWO is loaded into the remaining overlay space and the call:

```
PROCtwo(W$)
```

is carried out complete with parameters. As each procedure is completed and exited the overlay space occupied by that program is recovered – but you can still call any procedures within that overlay until it is overlayed by another set.

You've probably noticed that there is a lot of playing around with the system variable *W%*. This is because *With* saves the old value of *W%* and sets it equal to TRUE when you are entering an overlay. That means that your procedures can check to see if they are being used as overlays or not since this might affect what they do.

When you specify a file as an overlay you can use any legal definition. For example:

```
60 *WITH :1.$.UTILIB.OSUTILS'osdefs
```

will find and load OSUTILS from the ADFS directory UTILIB on drive 1 and allow access to PROCosdefs defined in OSUTILS.

After a *With*ed procedure has been run, the variables defined in it and other procedures and functions used in it will be known to the main program. The variables will be permanently avail-

Turn to Page 60 ▶

"We need a set of routines that can be loaded and then overlayed"

Three short programs to demonstrate using With

```
10 REM EXAMPLE
20 REM reserve overlay space
30 *WITH 2
40 W%=FALSE:W$="W"
50 *WITH ONE'one
60 IF W% W$=W$+"G" ELSE W$=W$+"H"
70 PRINT W$"!"
80 END
```

```
10 REM ONE
20 *WITH 1
30 W%=TRUE:W$="FR"
40 IF W% W$=W$+"EE" ELSE W$=W$+"FF"
50 W$=W$+" ":PROCone:PRINTW$"!"
60 END
70 DEFPROCone:PRINT" ONE -> ";
80 IF W% W$=W$+"I":*WITH two(W$)
90 IF NOT W% W$=W$+"J"
100 ENDPROC
```

```
10 REM TWO
20 W%=FALSE:W$="OF"
30 PROCtwo(W$)
40 PRINTW$
50 END
60 DEFPROCtwo(T$)
70 PRINT"TWO -> ";
80 IF W% W$=T$+"T"
90 IF NOT W% W$=T$+"F"
100 ENDPROC
```

◀ *From Page 59*

able, although the functions and procedures can only be used until the next *With*.

It's always good practice to use the:

```
*WITH n
```

form at the start of your program. Here *n* is the number of 256 byte blocks you want to reserve for overlays and is expressed as a single hexadecimal digit. Either this command or the first overlay use of *With* causes a gap to be produced between the top of the program and the bottom of the variable storage space – see Figure I. If you have defined any variables before the first *With* they will be lost.

There are several error messages generated by *With*. If a file is not found, the error report is:

```
?WITH file ...
```

And if the file is too big to load into the gap, execution ceases with the error message:

```
?WITH gap ...
```

If *With* has no argument or *With n* is used and *n* is not hexadecimal you'll get:

```
?With arg ...
```

In Basic you can use *With* to execute one-time or infrequently used procedures. Don't use *With* to repeatedly bring in often used procedures because the disc will rattle and execution will be slowed down.

But for one-offs like PROCinit and occasional use of library procedures *With* will make your programming that much easier and more concise.

Well that's it: Now you can write long programs easily – may the force be *With* you.

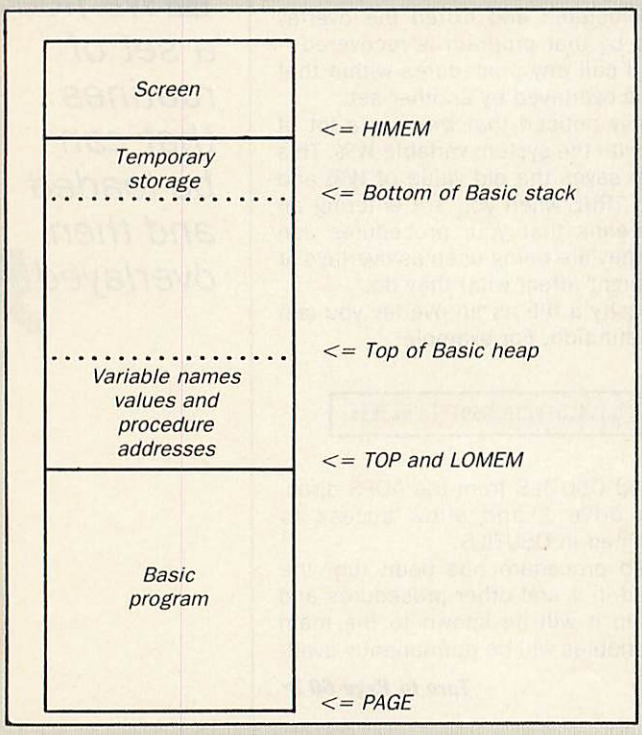

Figure Ia: Normal memory arrangement

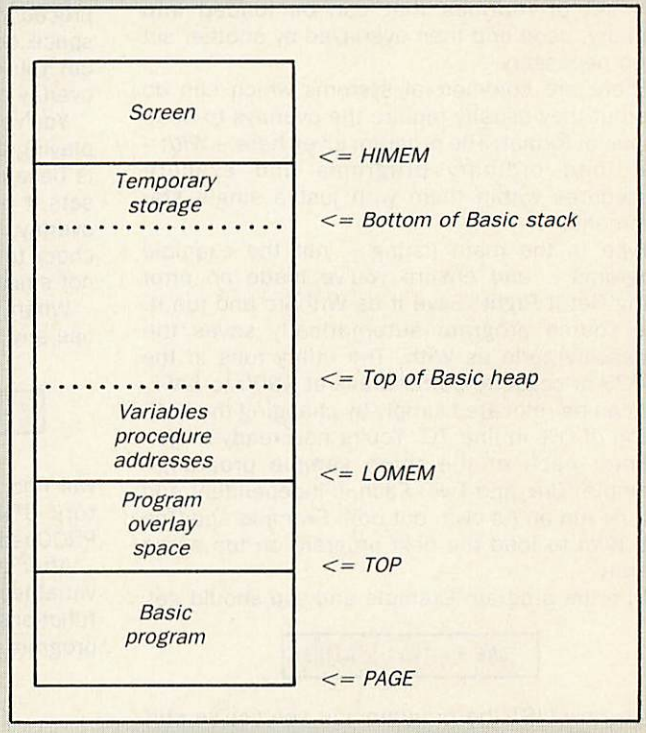

Figure Ib: Memory arrangement with overlays

```
 10 REM WITHSRC
 20 REM by Ray Wilson
 30 REM (c) The Micro User
 40 MODE7:osfile=&FFDD:oscli=&FFF7
 50 W%=&45C:lmem=&00:vrtp=&02
 60 top=&12:tptr=&0B:ysav=tptr-1
 70 rtn=&0D:C$=CHR$rtn:Q%=&900
 80 FOR L%=0 TO 2 STEP2
 90 P%=Q%:[OPT L%
100 .WITH LDY #5:LDX #0
110 .Wread LDA (tptr),Y:INY
120  CMP #ASC" ":BEQ Wread
130  CMP #rtn:BEQ Wspnd
140  CMP #ASC"":BEQ Wspnd
150  CMP #ASC"(":BEQ Wspnd
160  STA Wspec,X:INX:BNE Wread
170 .Wspnd CPX #2:BCS Wfind
180  LDA Wspec:SEC:SBC #&30
190  BEQ Wbarg:BMI Wbarg
200  CMP #&A:BCC Wp1_F
210  CMP #&11:BCC Wbarg
220  CMP #&17:BCS Wbarg
230  SEC:SBC #7
240 .Wp1_F CLC:ADC lmem+1:BNE Wsetg
250 .Wmake LDA top:STA lmem:STA vrtp
260  LDA top+1
270 .Wsetg STA lmem+1:STA vrtp+1:RTS
280 .Wbarg BRK:BRK
290  OPT FNs("?WITH arg"):BRK
300 .Wfind PHA:LDA #rtn:STA Wspec,X
310  TYA:PHA:TXA:PHA
320  LDA #Wspec MOD256:STA Wpars
330  LDA #Wspec DIV256:STA Wpars+1
340  LDA #5:JSR Wosfile
350  CMP #1:BEQ Wffnd:JMP Wferr
360 .Wffnd PLA:LDA top:SEC:SBC #2
```

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Get it right!

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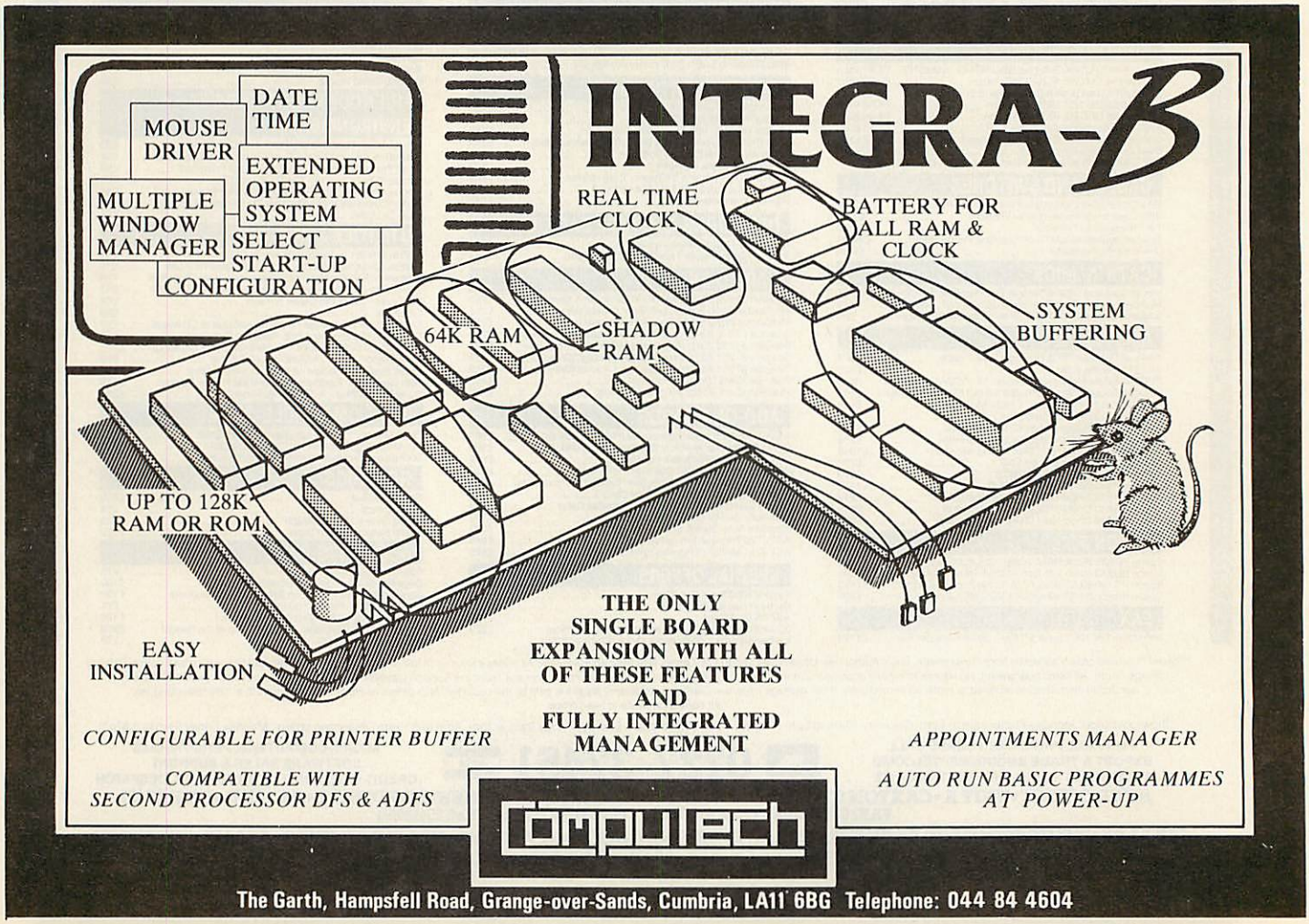
```
370  STA top:LDA top+1:SBC #0
380  STA top+1:PLA:TAY:PLA
390  CMP #ASC"":BEQ Wprld:LDY #6
400 .Wprld TYA:TAX:LDY #1:LDA #0
410  STA (top),Y:INY:STA (top),Y:INY
420  INY:LDA #&F2
430 .Wputx STA (top),Y:INY:JSR Wgetc
440  CMP #rtn:BNE Wputx
450  DEX:TXA:PHA:LDX #0
460 .Wldxl LDA Wline,X:BEQ Wwsav
470  STA (top),Y:INY:INX:BNE Wldxl
480 .Wwsav LDX #3
490 .Wsavw LDA W%,X:STA (top),Y:INY
500  LDA #&FF:STA W%,X:DEX:BPL Wsavw
510  PLA:TAX:LDA tptr:PHA:LDA tptr+1
520  PHA:CLC:TXA:ADC tptr:PHA
530  LDA tptr+1:ADC #0:PHA:LDA top
540  STA tptr:STA (top),Y:INY
550  LDA top+1:STA tptr+1:STA (top),Y
560  INY:PLA:STA (top),Y:INY
570  PLA:STA (top),Y:INY:TYA
580  LDY#3:STA (top),Y:CLC:ADC top
590  STA Wpars+2:PHA:LDA top+1:ADC #0
600  STA Wpars+3:TAX:CLC:PLA
610  ADC Wpars+10:STA top:TXA
620  ADC Wpars+11:STA top+1:LDA lmem
630  SEC:SBC top:LDA lmem+1:SBC top+1
640  BPL Wgpok:LDA lmem+1:CMP vrtp+1
650  BNE Wgerr:LDA lmem:CMP vrtp
660  BNE Wgerr:JSR Wmake
670 .Wgpok PLA:PLA:LDA #0:LDX #3
680 .Wzera STA Wpars+3,X:DEX
690  BNE Wzera:STA tptr-1:LDA #&FF
700 .Wosfile LDX #Wpars MOD256
710  LDY #Wpars DIV256:JMP osfile
720 .Wgetc STY ysav:TXA:TAY
730  LDA (tptr),Y:INX:LDY ysav:RTS
740 .Wline OPT FNs(":"+CHR$&D6+"&")
750  OPT FNs(LEFT$(STR$~HTIW+" ",4))
760  OPT FNs(":"):BRK
770 .Wgerr PLA:STA tptr+1:PLA
780  STA tptr:BRK:BRK
790  OPT FNs("?WITH gap"):BRK
800 .HTIW LDY #1:LDX #3
810 .Wrclm LDA (tptr),Y:STA W%,X
820  INY:DEX:BPL Wrclm
830  LDA (tptr),Y:STA top:INY
840  LDA (tptr),Y:STA top+1:INY
850  LDA (tptr),Y:PHA:INY
860  LDA (tptr),Y:PHA
870  LDY #1:LDA #&FF:STA (top),Y
880  CLC:INC top:INC top
890  BCC Whtiw:INC top+1
900 .Whtiw PLA:STA tptr:PLA
910  STA tptr+1:LDA #0:STA tptr-1:RTS
920 .Wpars:]:P%=P%+18:[OPT L%
930 .Wferr PLA:TAX:LDA #0
940  STA Wspec,X:BRK:BRK
950  OPT FNs("?WITH file "):BRK
960 .Wspec:]:NEXT
970 $&700="SAVE WITH "+STR$~Q%+" "+STR
$~P%
980 PRINT"Saving WITH"
990 X%=0:Y%=7:CALL oscli:END
1000 DEFFNb(B%):?P%=B%:P%=P%+1:=L%
1010 DEFFNs(A$):$P%=A$:P%=P%+LENA$:=L%
```

```
 10 =    0 0
 20 =    0 0
 30 =    0 0
 40 = A375 5
 50 = A92A 9
 60 = 826D 1
 70 = EFC1 1
 80 = 905A 8
 90 = 6808 C
100 = AF79 4
110 = 24FA C
120 =  557 4
130 = A486 9
140 = C305 A
150 = D0E6 9
160 = 8925 2
170 = 2525 3
180 = D653 F
190 = 56A1 5
200 = 4458 1
210 = 1C1B 2
220 = DA94 E
230 = 6628 1
240 = 3F88 0
250 = 316B E
260 = 7E2B 0
270 = FC71 2
280 = 561F 9
290 = 4671 F
300 = 72F1 3
310 = B823 B
320 = EF09 3
330 = 2DA2 5
340 = 64E5 7
350 = C1F6 5
360 = 9E29 8
370 = 7A0D 2
380 = D743 F
390 = DB75 8
400 = 1AA7 A
410 = 1D71 7
420 = FFEC 0
430 = 287C 1
440 = CBBD 6
450 = 3240 C
460 = DFF8 B
470 = 3CE8 6
480 = 2072 E
490 = D880 6
500 = BA7F 4
510 = DBC0 C
520 = 8C57 6
530 = CC48 2
540 = 64D4 4
550 = B413 7
560 = 5000 2
570 = B54F 9
580 = 8B38 8
590 = 499E 6
600 = 2CE3 1
610 = 76B0 8
620 = 3A4E 4
630 = 6845 6
640 = D839 1
650 = B945 2
660 = 1E26 0
670 = D373 D
680 = F969 D
690 = 4A5F A
700 = 27B1 F
710 = 57FE A
720 = 58BF 4
730 = 3FE3 8
740 = AF75 1
750 =  5AE E
760 = CB50 2
770 = 19C9 0
780 = 2207 3
790 = C707 D
800 = A268 0
810 = 6312 D
820 = 1B32 6
830 = BF69 0
840 = 9DCB 3
850 = C81F B
860 = 9923 F
870 = 140E D
880 = 9901 0
890 = 442E 3
900 = 72A0 D
910 = 6058 7
920 = F655 5
930 = 5C87 A
940 = CE8E E
950 = A0DB 5
960 = 347A 6
970 = 5139 D
980 = D521 1
990 = DE18 1
1000 =  D4A A
1010 = 3016 8
```

Control the beast

Andrew Moore shows how you can get more from your Z88 display

CAMBRIDGE Computer's new portable has been designed for a large number of uses, from word processing and electronic filofax to portable data entry ready to transfer to your BBC Micro. It certainly isn't a toy, but this is not going to prevent a large number of users from trying to add one more item to the list of Z88 roles – leisure.

With a view mainly to this potential use let's look at some simple, effective ways that the display can be brought under the programmer's control from Basic.

To start with, we can make simple use of the VDU command. Last month John Allen considered commands of the form VDU1,n where *n* is some number. To remind you, call up Basic on your Z88 and type VDU1,82. From now on you will find that characters output to the display are reversed. This will continue until you type VDU1,82 again, which will send you back to normal.

"Why 82?" This is because 82 is the Ascii code for the character R – for Reverse. To make life easier, it is probably best to let the machine do the converting for you by specifying the command as VDU 1,ASC"R".

Reversing characters is only the first in a whole series of bizarre things you can do to the output mode of the display discussed last month. The panel on the right summarises the effects available.

A command not mentioned was VDU1,127 which sets all toggles to the off position – 127 is the Ascii code for Delete. This could be useful after setting your output to flashing reversed tiny text or whatever else has taken your fancy. Unfortunately it will also switch off the cursor and vertical scrolling, so you have to toggle them back on with VDU 1,ASC"C" and VDU 1,ASC"S".

A useful feature of VDU commands can save some typing here. Several short ones can be concatenated into a larger one, so for example, the three necessary to return the screen to normal can all be brought into one statement:

```
VDU 1,127,1,ASC"C",1,ASC,"S"
```

Even more useful is the fact that a sequence of

Turn to Page 64 ▶

Summary of Z88 VDU1 commands for effects

Bold text	VDU1,ASC"B" or VDU1,66
Cursor	VDU1,ASC"C" or VDU1,67
Flashing text	VDU1,ASC"F" or VDU1,70
Grey text	VDU1,ASC"G" or VDU1,71
Upper case lock	VDU1,ASC"L" or VDU1,76
Reverse text	VDU1,ASC"R" or VDU1,82
Vertical scrolling	VDU1,ASC"S" or VDU1,83
Tiny text	VDU1,ASC"T" or VDU1,84
Underlined text	VDU1,ASC"U" or VDU1,85
Horizontal scrolling	VDU1,ASC"W" or VDU1,87

```
   10 REM User Defned Character Editor
   20 REM by Andrew More
   30 REM (c) The Micro User
   40 PROCinit:REPEAT:PROCact:UNTIL FALS
E
   50 DEF PROCinit
   60 DIM V(7):FOR I=0TO7:V(I)=191:NEXT
   70 CLS:W$="-":B$=CHR$127
   80 INPUT"Which label for the UDC (Ent
er A to P)";X$
   90 PROCdefine:CLS:PROCshow
  100 FORX=0TO5:FORY=0TO7:PRINTTAB(X,Y);
B$;
  110 NEXT:NEXT:X=2:Y=3:ENDPROC
  120 DEFPROCshow
  130 PRINT TAB(15,1);"The UDC looks lik
e this: ";
  140 VDU 1,130,ASC"?",ASC X$
  150 PRINT TAB(15,5);"To define: VDU1,1
38,ASC""=",ASC"""";X$;"""";
  160 FORI=0TO7:PRINT",";V(I);:NEXT
  170 PRINTTAB(15,6);"To print:  VDU1,13
0,ASC""?"",ASC"""";X$;"""";
  180 ENDPROC
  190 DEF PROCmove(dir)
  200 IF dir=255 Y=(Y+7) MOD 8
  210 IF dir=254 Y=(Y+1) MOD 8
  220 IF dir=253 X=(X+1) MOD 6
  230 IF dir=252 X=(X+5) MOD 6
  240 ENDPROC
  250 DEF PROCact
  260 PRINTTAB(X,Y);
  270 K=GET:IFK<>13 PROCmove(K):ENDPROC
  280 P=2^(5-X):wasset=(V(Y)AND P)<>0:V(
Y)=V(Y)EOR P
  290 IFwasset PRINT W$; ELSE PRINT B$;
  300 PROCdefine:PROCshow:ENDPROC
  310 DEF PROCdefine
  320 VDU1,138,ASC"=",ASC X$,V(0),V(1),V
(2),V(3),V(4),V(5),V(6),V(7)
  330 ENDPROC
```

◀ *From Page 63*

Ascii codes can be stored in a string which you can get PRINT to send to the VDU driver. In this case we could use:

```
NORMAL$=CHR$(1)+CHR$(127)+CHR$(1)+"C"+C
HR$(1)+"S"
```

Then whenever we want to get back to normal we just enter:

```
PRINT NORMAL$
```

So far we have only looked at simple VDU commands. There is a wealth of more complex ones, a lot of them being valuable tools for a leisure programmer.

Here I only have space for a few: They all have more than one extra argument after the 1 in the VDU statement as in last month's window command. In this case the second argument indicates how many more the VDU driver can expect and we specify there will be *n* by the code 128+n. One such command is:

```
VDU 1,128+4,ASC"!",32+x,32+y,32+z
```

Here *x, y* and *z* are numbers between 0 and 223. This produces a sound, formed as a square wave of *y* 100ths of a second of low followed by *z* 100ths of a second of high, repeated *x* times. As an example try:

```
VDU 1,128+4,ASC"!",32+200,32+1,32+1
```

Another convenient command is:

```
VDU 1,128+3,ASC"N",32+x,ASC"<char>"
```

where *<char>* is a string one character long. It will be output *x* times.

Finally let's deal with the most useful VDU command of all – the one that allows you to design characters yourself. As a result, instead of games such as *Shoot down the Hs with the Xs* we will be able to have *Zap the mega-terror cozmodroids with the lazer globules of death.*

On the unexpanded – no 128k ram in slot 1 – Z88 we can have 16 user-defined characters – UDCs – labelled A to P. They are six pixels wide and eight high and you program them by giving eight values between 0 and 63 with the nth corresponding to the nth row from the top.

Bit 0 – the least significant – of each value determines if the rightmost pixel of that row is set, while bit 1 defines the next rightmost. This continues until bit 5 which defines the leftmost.

Let's look at the command to define a UDC labelled *<char>*. It isn't the smallest command in the world:

```
VDU 1,128+10,ASC"=",ASC"<char>",128+v0,1
28+v1,128+v2,128+v3,128+v4,128+v5,128+v6
,128+v7
```

where v0 to v7 are the eight values. To print this new character you use:

```
VDU 1,128+2,ASC"?",ASC"<char>"
```

If you are planning to print this UDC several times it will aid efficiency and program legibility if you pack the sequence of codes into a string, as we did with *NORMAL$*. For example, if *A* was the label, we could enter

```
UDCA$=CHR$(1)+CHR$(128+2)+"?"+"A"
```

This can then always be printed using:

```
PRINT UDCA$
```

Here is a cute programmette to demonstrate a wild use of UDCs by filling the display with a random pattern of all eight of them, but continuously changing their definitions. Whenever one is changed, all instances of it on the display will also change:

```
10 REPEAT:Y=RND(7)+ASC"A":X=127+RND(64)
20 VDU 1,138,ASC"=",Y,191,X,X,X,X,X,X,1
91 : VDU 1,130,ASC"?",Y : UNTIL 0
```

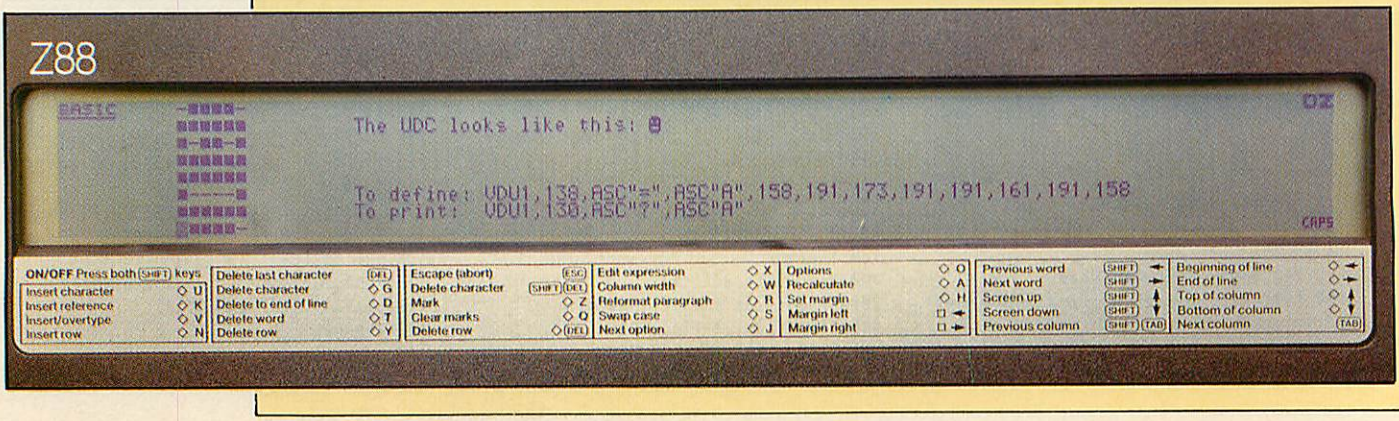
Worrying about bits can be tedious, so the listing gives a cheap and cheerful UDC editor. When you run the program you will be able to move a cursor around an 8 by 6 grid representing the character, and hitting Return toggles whether the current pixel is or isn't set.

The UDC itself is displayed and updated automatically as you change it. Also displayed are the VDU commands necessary to define the character and print it, so when you are satisfied with your creation, you can jot down the commands to include in your own programs.

So we've looked at the primary ingredient for writing leisure software – control of the display. The other major topic is animation. Here the Z88 provides us with both intriguing problems and entertaining possibilities.

● *Next month we'll look at these points and also an implementation of a classic game of Breakthrough to demonstrate some of the Z88's potential.*

'...a cheap and cheerful UDC editor'



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Trouble-free transfers

John Allen shows how to use Pipedream with other BBC Micro word processors

IT could be said that one of the best reasons for having a Z88 and a BBC Micro is that the Z88's word processor, Pipedream, is also available on the BBC Micro as View Professional. However, this often works out to be more of a theoretical than practical advantage, since the latter is relatively expensive. So you're more likely to have one of the more established word processors such as Mini Office II, Wordwise, Wordwise-Plus, Inter-Word or View.

This raises the question: How easily can you use Z88 Pipedream files in the BBC Micro's other word processors? In the case of View it is fairly easy. Save the Pipedream document as plain text before transferring the file to the BBC Micro, then set up a matching ruler in View and READ the file in. The only snag is that you'll have lost the highlights.

For the others, the answer is not so simple because the files are stored in a different way. However, if you use Wordwise, Wordwise-Plus or Mini Office II here's a handy conversion program that gives the answer. Inter-Word has a much more complex, and unpublished, file structure so unfortunately files cannot be converted so easily.

Because Pipedream works so differently from Wordwise and Mini Office II it is necessary to follow some conventions when you are creating documents on the Z88 which you will later want to load into your BBC Micro word processor.

Firstly, you should only type text in column A and avoid using Tab to move to other columns. Secondly, there should always be a blank line between paragraphs, so that the conversion program can spot where they end. Finally, you cannot use expression slots, as the BBC Micro packages have no equivalents of the spreadsheet functions.

Wordwise and Wordwise-Plus owners should type in Listing I. Mini Office II users need to type Listing I with the changes shown in Listing II. Save the program – Convert – before trying to run it.

You may have to change the highlight codes in Convert because the ones given in the data statements – lines 1600 to 1670 – assume that you have an Epson-compatible printer and use the eight standard highlights.

For other printers, or if you want to use different effects, you will need to enter the codes in the following order: Turn the highlight on, turn it off, then either *Y* – turn it off at the end of a line – or *N* – leave it on. Line 1600 corresponds to highlight 1, 1610 to the second and so on up to 1670, which corresponds to highlight 8.

The program allows you to convert a file already on your BBC Micro disc or, with a suitable serial connecting lead – see our offer on page 72 – it can take a Pipedream internal working file direct from the Z88.

If you are transferring from the Z88 you should note that a file – !!TEMP! – is created for temporary use.

The resulting page layout will be the same as in Pipedream, but if you've defined a header or a footer you'll find that the converter just copies the Pipedream definition – you'll need to correct that yourself before printing.

Not everything that can be done in Pipedream has a direct equivalent, so in these cases Convert ignores the command. The ones that it does translate from the options page are header, footer, top, bottom and left margins, line spacing, page length, justification, pages and the starting page number. Embedded within the

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"It's necessary to follow some conventions when creating Z88 documents"

◀ *From Page 67*

text it recognises highlight codes, centring, and page breaks – conditional and unconditional.

Pipedream stores each line with a Return at the end. Wordwise and Mini Office II only have Returns at the ends of paragraphs or where you specifically want them, say in an address. This means that there is no way to translate exactly from one format to the other and always get the intended result.

So Convert makes two assumptions. The first, as already mentioned, is that there is a blank line between paragraphs and the second is that any line with more than 18 blank characters at the end is a line in itself. Convert inserts a Return at that point so this should cope, for example, with addresses. If you find that 18 is not the best value for your needs, just change the figure in line 1200.

So there it is. Now you can create documents – including the commands – on your portable micro and edit them later using your favourite BBC Micro word processor.

Listing I: Pipedream to Wordwise converter

```
  10 REM Pipedream to Wordwise file con
verter
  20 REM by John Allen
  30 REM (C) The Micro User
  40 :
  50 DIM high$(8,3),high%(8),translate$
(8,2),headfoot$(4),headfoot%(4)
  60 FOR I% = 1 TO 8:FOR J% = 1 TO 3
  70 READ high$(I%,J%)
  80 NEXT
  90 high%(I%) = 0
 100 NEXT
 110 FOR I% = 1 TO 8:FOR J% = 1 TO 2
 120 READ translate$(I%,J%)
 130 NEXT:NEXT
 140 FOR I% = 1 TO 4
 150 READ headfoot$(I%),headfoot%(I%)
 160 NEXT
 170 MODE 7
 180 banner$ = CHR$(132) + CHR$(157) +
CHR$(141) + CHR$(131) + "Pipedream to Wo
rdwise Conversion"
 190 PRINT TAB(0,2) banner$
 200 PRINT TAB(0,3) banner$
 210 PRINT TAB(0,7) CHR$(131);"1) Impor
t file from Z88"
 220 PRINT TAB(0,8) CHR$(131);"2) Conve
rt file on BBC disc"
 230 PRINT TAB(0,11) "Please enter choi
ce:";CHR$(134);
 240 REPEAT:choice$ = GET$:UNTIL INSTR(
"12",choice$) <> 0
 250 PRINT choice$
 260 IF choice$ = "2" THEN PRINT TAB(0,
15) "BBC filename:";CHR$(134);:INPUT ""
pfile$:GOTO 460
 270 *FX7,7
 280 *FX2,1
 290 PRINT TAB(0,14) "Send file using Z
88 Import/Export"
 300 PRINT TAB(3,16) CHR$(131);"Transmi
t baud rate 9600"
 310 PRINT TAB(3,17) CHR$(131);"
    Parity None"
 320 PRINT TAB(3,18) CHR$(131);"
  Xon/Xoff No"
 330 REPEAT:B% = GET:UNTIL B% = 27
 340 B% = GET:IF B% <> 70 THEN GOTO 330
 350 PRINT TAB(0,20) "Receiving file ..
.."
 360 pfile$ = "!!TEMP!"
 370 H% = OPENOUT pfile$
 380 B% = GET
 390 REPEAT
 400 BPUT#H%,B%
 410 B% = GET
 420 UNTIL B% = 27
 430 B% = GET:IF B% <> 90 AND B% <> 69
THEN BPUT#H%,27:GOTO 390
 440 *FX2,0
 450 CLOSE#H%
 460 X% = OPENIN pfile$
 470 IF X% = 0 THEN PRINT 'CHR$(130);pf
ile$;" does not exist""Press any key":b
$ = GET$:GOTO 170
 480 PRINT "Wordwise filename:";CHR$(1
34);:INPUT "" wfile$
 490 Y% = OPENOUT wfile$
 500 PROCoptions
 510 PROCtext
 520 PROCsendtext("BP")
 530 CLOSE#0
 540 IF choice$ = "1" THEN *DELETE !!TE
MP!
 550 END
 560 :
 570 REM decode options
 580 DEFPROCoptions
 590 PROCsendtext("EP")
 600 PROCsendtext("DF"):BPUT#Y%,13
 610 :pl% = 66:foot% = 0:head% = 0
```

This listing is included in this month's tape & disc offer. See order form on Page 151.

```
 620 REPEAT:B% = BGET#X%:UNTIL B% = ASC
"%"
 630 B% = BGET#X%:IF B% <> ASC"0" THEN
GOTO 860
 640 IF BGET#X% <> ASC"P" OR BGET#X% <>
 ASC"%" THEN GOTO 620
 650 code$ = CHR$(BGET#X%) + CHR$(BGET#
X%)
 660 FOR I% = 1 TO 8
 670 IF code$ <> translate$(I%,1) THEN
NEXT ELSE GOTO 690
 680 GOTO 790
 690 PROCsendtext(translate$(I%,2))
 700 pl$ = ""
 710 IF code$ = "JU" THEN B% = BGET#X%
 720 B% = BGET#X%
 730 IF code$ = "PL" AND B% <> 13 THEN
pl$ = pl$ + CHR$(B%)
 740 IF B% <> 13 THEN BPUT#Y%,B%:GOTO 7
20
 750 IF code$ = "HE" THEN head% = 1
 760 IF code$ = "FO" THEN foot% = 1
 770 IF code$ = "PL" THEN pl% = VAL(pl$
)
 780 I% = 8:NEXT:GOTO 620
 790 FOR I% = 1 TO 4
 800 IF code$ <> headfoot$(I%) THEN NEX
T ELSE GOTO 820
 810 GOTO 620
 820 size$ = CHR$(BGET#X%)
 830 B% = BGET#X%
 840 IF B% <> 13 THEN size$ = size$ + C
HR$(B%):GOTO 830
 850 headfoot%(I%) = VAL(size$):GOTO 62
0
 860 BS% = headfoot%(1) + headfoot%(2)
+ foot%
 870 TS% = headfoot%(3) + headfoot%(4)
+ head%
 880 PROCsendtext("BS"):PROCnumber(BS%)
 890 PROCsendtext("TS"):PROCnumber(TS%)
 900 IF head% = 1 THEN PROCsendtext("HP
"):PROCnumber(headfoot%(4)+1)
 910 fp% = headfoot%(2) + 1
 920 PROCsendtext("FP"):PROCnumber(fp%)
 930 PTR#X% = PTR#X% + 4
 940 REPEAT:B% = BGET#X%:UNTIL B% = ASC
","
 950 ww$ = ""
 960 B% = BGET#X%
 970 IF B% <> ASC"%" THEN ww$ = ww$ + C
HR$(B%):GOTO 960
 980 PROCsendtext("LL"):PROCnumber(VAL(
ww$)-1)
 990 BPUT#Y%,13
1000 ENDPROC
1010 :
1020 REM send a number
1030 DEFPROCnumber(n%)
1040 IF n% < 10  THEN BPUT#Y%,n%+48:END
PROC
1050 IF n% < 100 THEN BPUT#Y%,(n% DIV 1
0)+48:BPUT#Y%,(n% MOD 10)+48:ENDPROC
1060 BPUT#Y%,(n% DIV 100)+48:BPUT#Y%((n
% DIV 10)-10*(n% DIV 100))+48:BPUT#Y%,(n
% MOD 10)+48
1070 ENDPROC
1080 :
1090 REM translate text
1100 DEFPROCtext
1110 endcol% = 0:cr% = 0
1120 REPEAT
1130 char% = 0
1140 REPEAT
1150 IF endcol% = 1 THEN GOTO 1210
1160 B% = BGET#X%
1170 IF B% = ASC"%" THEN PROCdecode:GOT
O 1150
1180 IF B% <> 13 THEN BPUT#Y%,B%:char%
= char% + 1:GOTO 1210
1190 IF char% = 0 AND cr% = 0 THEN BPUT
#Y%,13:BPUT#Y%,13:cr% = 1:GOTO 1210
1200 IF VAL(ww$)-char% > 18 THEN BPUT#Y
%,13:cr% = 1 ELSE cr% = 0
1210 UNTIL B% = 13
1220 FOR I% = 1 TO 8
1230 IF high%(I%) = 1 AND high$(I%,3) =
```

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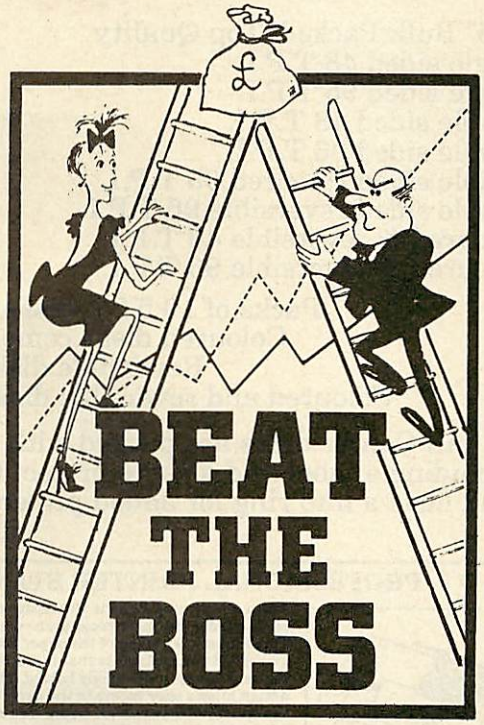

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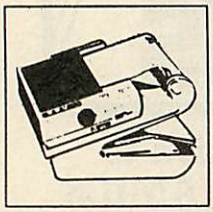

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VISA

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```
"Y" THEN PROCsendtext(high$(I%,2))
 1240 high%(I%) = 0
 1250 NEXT
 1260 UNTIL endcol% = 1
 1270 ENDPROC
 1280 :
 1290 REM decode embedded commands
 1300 DEFPROCdecode
 1310 B% = BGET#X%
 1320 IF B% <> ASC"H" THEN GOTO 1360
 1330 B% = BGET#X% - 48
 1340 IF high%(B%) = 0 THEN PROCsendtext
(high$(B%,1)):high%(B%) = 1 ELSE PROCsen
dtext(high$(B%,2)):high%(B%) = 0
 1350 GOTO 1480
 1360 IF B% <> ASC"C" THEN GOTO 1400
 1370 B% = BGET#X%
 1380 IF B% = ASC"%" PROCsendtext("CE"):
BPUT#Y%,7:ENDPROC
 1390 B% = 13:endcol% = 1:ENDPROC
 1400 IF B% <> ASC"P" THEN GOTO 1470
 1410 B% = BGET#X%
 1420 IF B% = ASC"C" THEN BPUT#Y%,ASC"%"
:GOTO 1480
 1430 IF B% = ASC"0" THEN PROCsendtext("
BP"):BPUT#Y%,7:GOTO 1480
 1440 cp$ = CHR$(B%)
 1450 B% = BGET#X%:IF B% <> ASC"%" THEN
cp$ = cp$ + CHR$(B%):GOTO 1450
 1460 PROCsendtext("CP"+cp$):ENDPROC
 1470 IF B% = ASC"V" THEN PRINT "** Fai
lure - expression slot **":REPEAT:B% = B
GET#X%:UNTIL B% = 13:FOR I% = 1 TO 8:BPU
T#Y%,ASC"*":NEXT:BPUT#Y%,13:ENDPROC
 1480 REPEAT:B% = BGET#X%:UNTIL B% = ASC
"%"
 1490 ENDPROC
 1500 :
 1510 REM send highlights
 1520 DEFPROCsendtext(text$)
 1530 BPUT#Y%,2
 1540 FOR I% = 1 TO LEN(text$)
 1550 BPUT#Y%,ASC(MID$(text$,I%,1))
 1560 NEXT
 1570 IF LEN(text$) > 2 THEN BPUT#Y%,7
 1580 ENDPROC
 1590 :
 1600 DATA "0C27,45,1","0C27,45,0",Y
 1610 DATA "0C27,69","0C27,70",Y
 1620 DATA "0C27,87,1","0C27,87,0",N
 1630 DATA "0C27,52","0C27,53",Y
 1640 DATA "0C27,83,1","0C27,84",Y
 1650 DATA "0C27,83,0","0C27,84",Y
 1660 DATA "0C15","0C18",N
 1670 DATA "0C27,120,1","0C27,120,0",N
 1680 DATA FO,DF,HE,DH,JU,JO,LM,LM,LS,LS
,PL,PL,PA,CO,PS,PN
 1690 DATA BM,8,FM,2,HM,2,TM,0
```

Listing II: Changes for Mini Office II

```
  180 banner$ = CHR$(132) + CHR$(157) +
CHR$(141) + CHR$(131) + "Pipedream to Mi
ni Office Conversion"
  480 PRINT "Mini Office II filename:";
CHR$(134);:INPUT "" wfile$
  520
  600 PROCsendtext("DF"):BPUT#Y%,3
 1380 IF B% = ASC"%" PROCsendtext("CE"):
BPUT#Y%,3:ENDPROC
 1430 IF B% = ASC"0" THEN PROCsendtext("
BP"):BPUT#Y%,3:GOTO 1480
 1600 DATA "CC27,45,1","CC27,45,0",Y
 1610 DATA "CC27,69","CC27,70",Y
 1620 DATA "CC27,87,1","CC27,87,0",N
 1630 DATA "CC27,52","CC27,53",Y
 1640 DATA "CC27,83,1","CC27,84",Y
 1650 DATA "CC27,83,0","CC27,84",Y
 1660 DATA "CC15","CC18",N
 1670 DATA "CC27,120,1","CC27,120,0",N
 1680 DATA FO,DF,HE,DH,JU,FJ,LM,LM,LS,LS
,PL,PL,PA,PO,PS,PN
```

This listing is included in this month's tape & disc offer. See order form on Page 151.

ARE YOU GETTING THE MOST OUT OF YOUR MICRO?

If you are an experienced user who can get your BBC to do everything you want it to, then read no further.
BUT if you can sympathise with any of the following comments, help is at hand!

- "The sales demo made everything look so easy. My problems only started when I got it home."
- "The manuals assume that I have done all this before. It just doesn't seem to do the same kind of things for me."
- "Reference books are fine if you know what you are looking for. It's not just a case of new jargon, I simply don't understand what I have to do to make my micro achieve these results."
- "I think of my computer now as little more than an expensive error of judgement. It only seems to be capable of playing games."
- "My intentions and original objectives are quickly losing direction."
- "What I really need is help at a personal level. Somewhere that I can turn to that actually knows my complete computer system."

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- This means that we can supply you with extensive educational and games software known to work with your BBC Micro. We expect that you will want to see these and evaluate them before buying. If you are really interested a longer trial can be arranged for you at home.
- We aim to offer you our best independent advisory and tutorial service eg: a chance to compare one word processing package against another.
- You may need to get some repairs done at an authorised dealer or want to trade-in your existing micro for an upgrade. This would enable you to take advantage of the new software if required.

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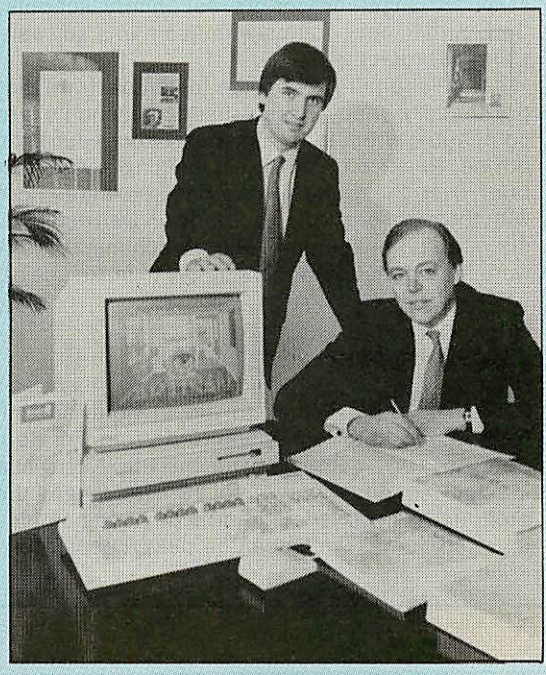
MU6

U·P·D·A·T·E

Acorn appoints distributor

IN a move that completes its education supply and support network, Acorn has appointed A B European Marketing as a distributor of its entire product range.

Sales and marketing director Ian Laurence said: "Already well-known in education circles, A B European Marketing will complement the work that has been done by Kelator in building up a network of specialist Acorn dealers across the UK".



Signing up . . . Ian Laurence, Acorn's Sales and Marketing Director (left) with Conny Lindwall, A B's Marketing Director

Spanish course

THE latest language course from LCL (0491 579345) is Micro Spanish, a 24-program suite for the entire Acorn range of computers. In common with the new GCSE exam, it emphasises practical Spanish, using sound and cartoon-style graphics.

Econet compatible, it consists of two discs, a voice tape and two manuals, and costs £24.

Video volcanoes

A NEW advanced interactive videodisc called Volcanoes has been announced by BBC Enterprises (01-743 5588). Developed by the BBC Interactive Television Unit and the educational division of Oxford University Press, it will run on the Domesday and Ecodisc system.

Using spectacular moving film, still photographs, text and graphics, the program illustrates vulcanology and plate tectonics – the forces that, literally, shape the world.

How not to lose your shirt

A GAME which teaches how to run a company successfully has been released by RBRC Software (01-946 8641).

Don't Panic is a business simulation which places the student in charge of a shirt-making firm. It involves running the company in all its aspects except tax, runs on the BBC Micro and Master and costs £30.

Adventure in the bush

IN Australia's bicentennial year, a combined effort of authors on both sides of the globe has produced Bush Rescue – an interactive adventure for the BBC Master. The package was developed by Mike Matson of UK software house 4mation (0271 45566) and Australian David Smith of Jacaranda Software.

For ages 9 to 16, Bush Rescue is based around a group of city children on a camping holiday in an Australian national park. It teaches mathematics, language application, hypothesising and forward prediction and costs £21.

Bulk buy

AN agreement for the bulk purchase of software has been reached between Clares Micro Supplies and the Scottish Educational Forum. The Forum – which represents most Scottish education authorities – will be buying Archimedes and BBC Micro programs.

Archimedes sales rising

THE Archimedes is continuing its penetration of the education sector. Latest deals involve 54 machines for Northern Ireland and a special software project in Berkshire. Schools in the Londonderry, Limavady and Omagh areas are being equipped with the machines. Three secondary

Turn to Page 74 ▶

◀ From Page 73

schools will have specially created Archimedes rooms containing 10 machines each.

The remaining machines will go to other schools for curricular projects including music, art and the production of class magazines. After selecting the Archimedes as the recommended standard machine for its secondary schools, Berkshire is cooperating with Acorn in a software transfer project.

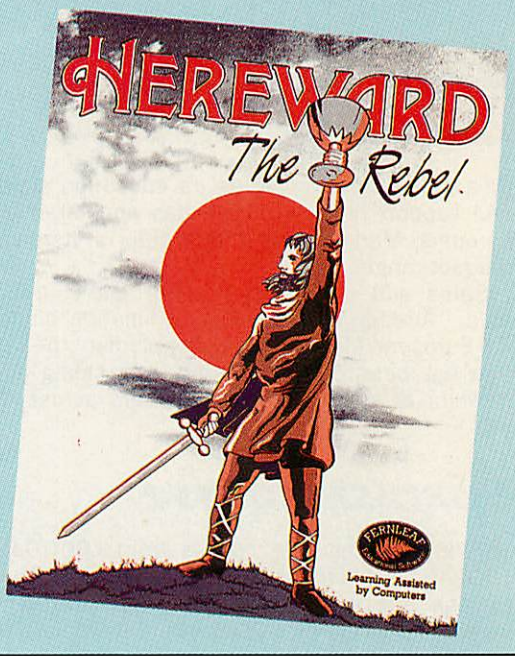
Acorn is funding a scheme to demonstrate that packages already widely used in schools are compatible with the Archimedes. Acorn education adviser Roger Brodie, who is keeping a watching brief over the project, has secured agreement with the local education authority in Derbyshire to maintain an online database of Archimedes software titles for all Britain's schools to make use of.

Norman history

NORMAN Britain comes to life in Hereward the Rebel, an historical adventure from Fernleaf Software (0474 359037) for the BBC Micro and Master. Aimed at the 9 to 13 age range, the program has two levels of difficulty and contains four sub-games which can be played separately. Price £17.35.

Boxed in

A NEW edition of the well-known box design program from Teacher's Software brings French into the craft, design and technology environment. Called Une Super Boite, the program *can be* operated in English or French and costs £29.95.



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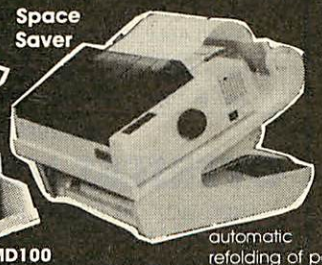

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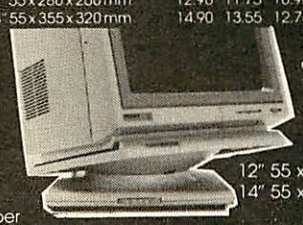

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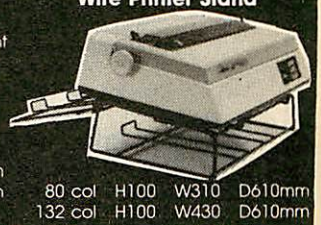

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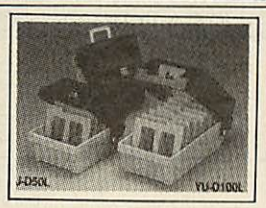

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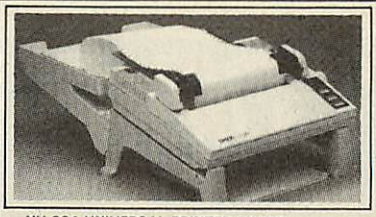

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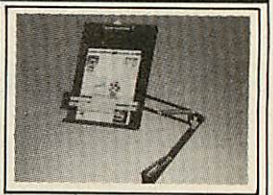

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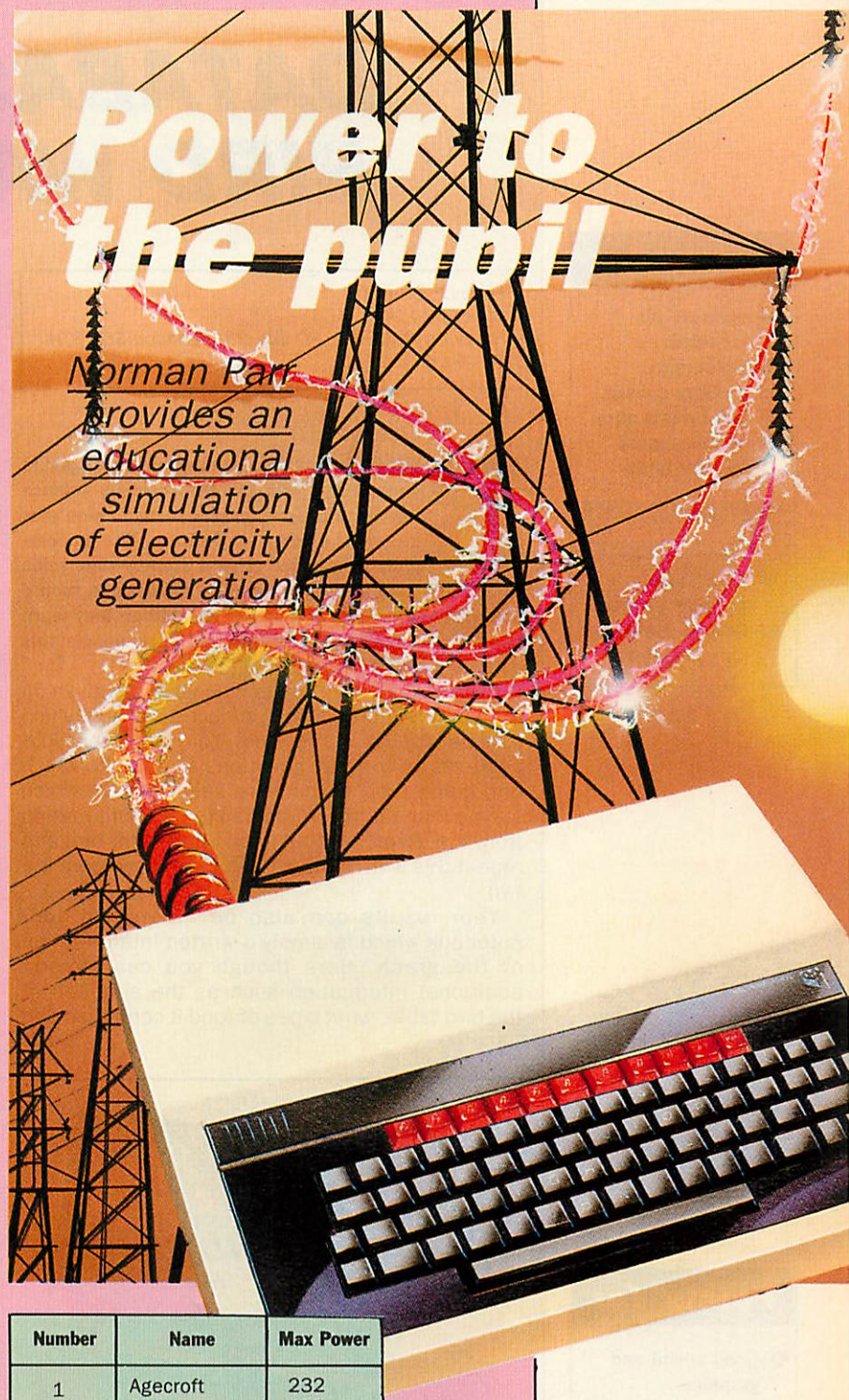
Power to the pupil

Norman Parr provides an educational simulation of electricity generation



THE workings of the Central Electricity Generating Board are a mystery known only to a few – but with this program you can control power distribution for a day. A 24-hour simulation may not seem much, but it is within that time all the major fluctuations in power requirements take place. And as controller you must ensure that the supply for each hour is enough to satisfy demand – before it happens.

To help you can call up details about which power stations are on line and what they're currently producing. The output levels of each can be altered to match demand in the next hour, without reducing supply below the current demand.

The power set up is controlled via the function keys – see Table I – and when you are ready to move to the next hour just press the spacebar. Since this is a form of game there is a scoring system, rated out of 100, based on how efficiently you supply the demand.

To alter the power output of a station using f9 it's necessary to know its number – although f0 lists all the stations it's worth keeping a separate list as shown in Table II. Pressing f8 gives an on-screen display of the keys to use.

There are two pumping stations within the simulation where, during off-peak times, spare power can be used to pump water up to a reservoir and during peak demand periods the stored water can be used to generate additional power.

If at any time there is a serious shortfall in supply the National Grid is automatically switched in to make up the difference – and you lose a large number of points.

Although this is just a simple simulation, it can easily form a part of a complete project on the subject of power generation and distribution. It also demonstrates quite effectively the difficulties of balancing supply with demand.

There are three listings and it is therefore faster to use a disc system. The first program, P-Map, draws the main screen and only needs to be run once to create and save the display. Type it in, ensure there are no errors using Get it Right!, and save it. When run it will draw the screen and save it as a separate file on tape or disc.

Listing II is Power! – this is the set-up and title routine. Once you've typed it in you can quite safely run it to test it: To move through the opening teletype sequence faster hold down the Shift key.

The actual simulation program is Listing III – Board. On no account run this before you've saved it because it relocates itself in memory. You must save it first. To run the simulation just CHAIN"Power!"

Turn to Page 135 ▶

Key	Action
f0	Station numbers
f1	Current power output
f2	Maximum power output
f3	Demand per hour so far
f4	Expected demand
f5	Pumping station control
f8	Help
f9	Change station power

Table I: Function key controls

Number	Name	Max Power
1	Agecroft	232
2	Bold	168
3	Carrington	240
4	Fiddlers Ferry	1880
5	Padiham	112
6	Roosecote	60
7	Wentwood	60
8	Ince	480
9	Cwm Dyli	5
10	Dinorwig	1725
11	Ffestiniog	360
12	Dolgarrog	27
13	Maentwrog	24
14	Rheidol	53
15	Trawsfynydd	390
16	Wylfa	840
17	Heysham	660

Table II: Power station numbers

DATABASE FOR BIRD WATCHERS

Product: Bird Spy
Price: £14.95
Supplier: BBC Soft, PO Box 234, London SE1 3TH.
Tel: 01-576 0548

Points for

- Example file included
- Encourages problem-solving and investigation
- Includes most popular birds

Against

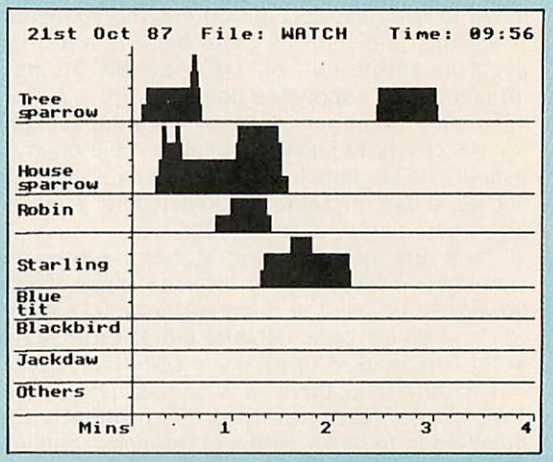
- Could take projects further
- Graphs confusing for youngsters

BIRD Spy is a database program developed in conjunction with the BBC primary science television programme for seven to nine year olds – Looking at Nature. The accompanying booklet gives a step-by-step guide to the program and aims to allow children to record observations quickly and easily. In addition they learn to interpret their observations and then handle this data on a micro.

Examples of what you can achieve are given on the WATCH file and this produces a graph which can be printed if required. You are given suggestions as to what questions to ask like which bird came first, which were seen most or which stayed longest? Then you can to take information from the graph relating to one particular bird and repeat this with another species and compare the two.

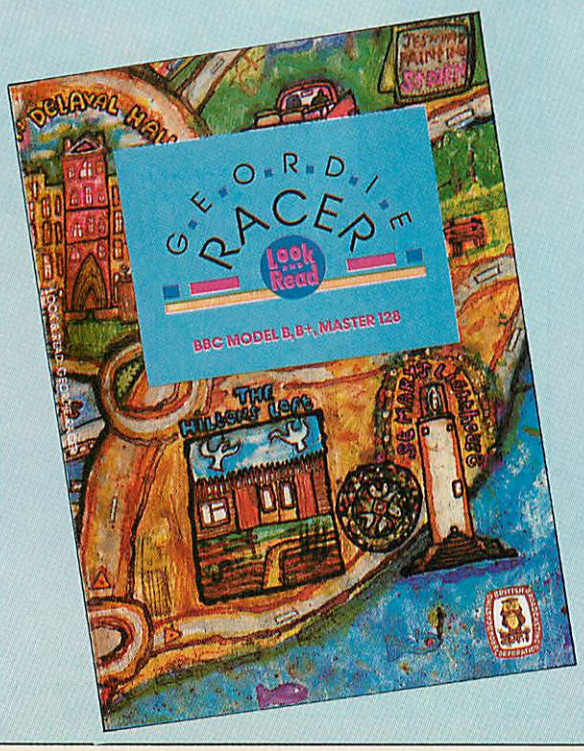
Your results can also be entered in your notebook which is simply a written interpretation of the graph. Here though you can include additional information such as the situation of the bird table, what types of food it contained and the weather conditions. Finally the day, date and time are included, which again can be printed if required.

To use the program with your class select the Set up system option, and name each file



according to who is to use it. You select the birds you are most likely to see and set the date and conditions. Entering the actual data is easy using only the spacebar, Return and Z to record the arrivals and departures. A nice feature is the built-in clock which records the time for you.

The graph itself gives a clear visual image of



A good way with words

Product: Geordie Racer
Price: £14.95
Supplier: BBC Soft, PO Box 234, London SE1 3TH.
Tel: 01-576 0548

Points for

- Good sound and graphics
- Lots of useful facts in manual

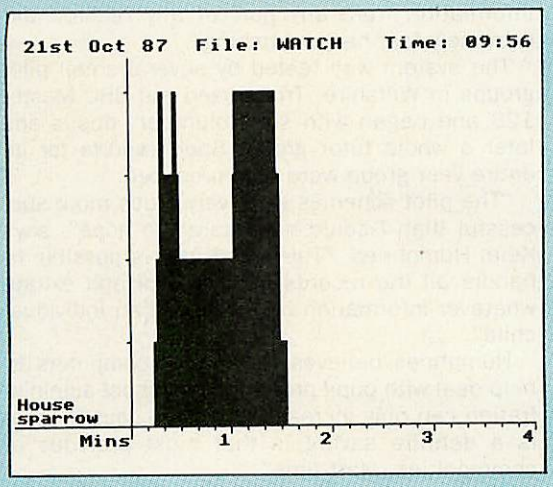
Against

- Too complex for target age

GEORDIE Racer is part of the Look and Read series for top infants and lower juniors to be used in parallel with, or independently from, the television series. The TV programme is concerned with life in the North East and uses a children's adventure to help put across a variety of reading skills.

Your hero is a boy called Spuggy and his adventure involves his family, his pigeons and a number of villains. The computer program develops this situation in a variety of enjoyable and interesting ways with 10 adventures. It starts with

the most popular birds with the vertical axis allowing for a time span of four minutes and the horizontal one up to five birds in some sections but only two in others. Unfortunately it has a

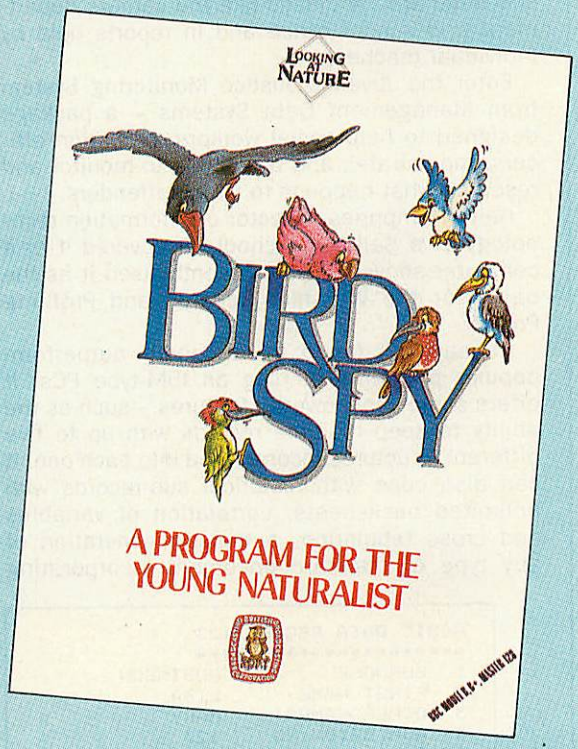


number of major drawbacks particularly the horizontal differentiations: The average seven to nine year old would find it very confusing.

It's difficult to use it to answer questions like which bird stayed the longest, which ones peck and run or which are the bossiest? On a more positive note, it is possible to use the data files with other databases such as Quest or Factfile and pupils can produce a file with whatever birds they require. Also producing individual records of birds is simple. The final section of the notes contains hints for teachers including looking at individual species of birds and also trying to make a video of what goes on around the bird table.

Bird Spy leads to a great deal of problem solving investigations with the emphasis on mathematics. Because of this it would be of more use to upper junior or even lower secondary pupils. It could make more use of reference skills and the bird project could be taken further with bright lower juniors but it would require a great deal of teacher expertise both in handling databases and in a knowledge of birds and their characteristics.

Gareth Gillingham



The bottom line...

Worth considering as a practical introduction to databases

a neat musical rendition of the television theme. After the introduction various menu options appear and these can be altered by the spacebar and selected by Return. To help you with your tasks you can choose a friendly pigeon.

Various language and mathematical tasks are set, though in many cases these were too difficult. But with trial and error a pattern began to develop. You now take part in simple problem solving exercises with multiple choice answers followed by directional work using the eight main compass points. Finally there are cloze procedure tasks and the building of smaller words from a larger pre-defined one.

If incorrect choices are made a character called Baz gets to the treasure first, but you can play again and hopefully be more successful. Towards the end of the program the options increase and more problems are set – often developing the skills acquired earlier. For example the directional problems take the form of planning a route through a maze and one of the final exercises asks questions about the problems the children have already solved.

The software is of the highest quality but probably more suitable for older children than those suggested. The graphics and sound quality are good and my only criticism is that the preliminary information is too complicated for seven to nine year olds – especially when the object is to encourage those with reading difficulties. *Confirm Your Choice* is one particularly bad example.

I find that the best type of educational program is the one which does not require a thick manual but does include problem solving elements that can be looked at in short spells. This gives small groups the opportunity to have 10 to 20 minute sessions at the micro. Geordie Racer is ideal. The handbook can also be used for developing the story and there is suggested work on training, keeping and racing pigeons and how they navigate and were used in the two World Wars.

The booklet also suggests how art and craft, mathematics and language work can be extended, while the television programme can be used as a stimulus for work on local radio and historical houses in the locality. To help with this there is a list of useful addresses and a comprehensive bibliography.

Geordie Racer is a thoroughly enjoyable package, well-presented, and attractive to a wide age spread in the primary school. **Gareth Gillingham**

The bottom line...

An enjoyable package to help children with reading difficulties

Pupil profiling

Juvenile offenders package may be the answer. Tony Leah investigates

A BBC Micro software package written to keep track of what happens to young offenders could be the answer for schools facing the difficult task of pupil profiling.

By 1990 the government wants all school leavers to have their own personal profile – a nightmare paper-chase if the required data is scattered among places like the careers department and school office and in reports held by individual teachers.

Enter the Juvenile Justice Monitoring System from Management Data Systems – a package designed to help social workers, probation officers, magistrates and the police to monitor and research what happens to young offenders.

Keith Humphries, director of information technology at a Salisbury school, discovered it at a computer show and subsequently used it as the basis for the Wiltshire Records and Profiling Project.

He says: "I found it can easily outperform popular programs running on IBM-type PCs. It offers some very powerful features – such as the ability to keep multiple records with up to five different structures incorporated into each one. It can also cope with historical sub-records with unlimited backsheets, correlation of variables and cross tabulation, automatic generation of any type of standard document incorporating information from any part of any record, and extremely fast hash searching".

"It offers some very powerful features"

The system was tested by several small pilot groups in Wiltshire. Trials used the BBC Master 128 and began with six "volunteer" pupils and later a whole tutor group. Short reports for an entire year group were also produced.

"The pilot schemes were very much more successful than I could have dared to hope", says Keith Humphries. "They showed it is possible to handle all the records for a school and extract whatever information is needed on an individual child".

Humphries believes the use of computers to help deal with pupil profiling and school administration can only increase, if only because "there is a definite saving in that most precious of commodities, staff time".

The package was also trialled in Surrey where one headmaster said: "I'm often asked for lists of children born between certain dates. Using the package this is the work of a moment.

"Lists for the school medical officer, tabulation routines which print out a table of year against class, and lists when required of classes, years, boys, girls – and any combination of these – make this a very effective method of storing information.

"I can find out how many children in any group have, for example, difficulty in reading or maths. I can type a letter on Wordwise and insert information from various fields in the program, so if necessary I can send individually addressed letters to parents".

"The fact that this powerful database runs on the BBC Micro was the main criterion for trialling it in Manchester's special schools," says Wendy McHugh of Booth Hall Hospital School.

"One school reported that it had reduced record keeping from three days to one, and was able to assess its staffing allocation and pupil needs more thoroughly than before".

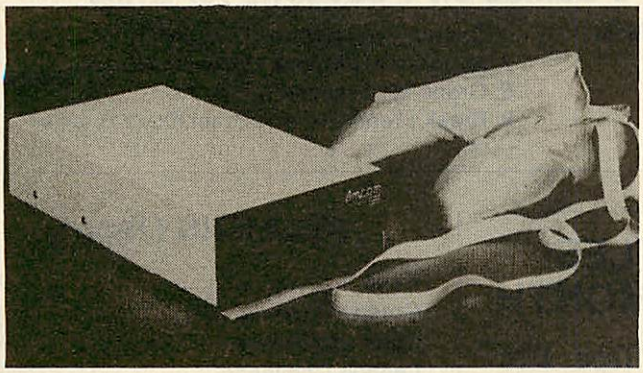
The system in its form for schools records management is called MPSS and costs £100, while the more complete JJMS costs £500. Both are from Management Data Systems (051-226 1214).

```
BASIC DATA RECORD 123
*********************
1  SURNAME          ROBINSON
2  FIRST NAME       LISA
3  OTHER NAMES      MARY
4  ADMISSION NO     123
5  TUTOR GROUP      BZ1
6  FORM TUTOR       KENNING
7  HEAD OF YEAR     MRS BUSWAY
8  SENIOR TUTOR     MR K. HUMPHRIES
9  HEAD TEACHER     MRS J. JOYNSON
```

```
CAREERS RECORD RECORD 123
*************************
1  DATE OF WRK EX   12.7.85
2  EX PLACEMENT     MR HYATT. WOOLWORTHS. COUNTER ASSISTANT.
3  EMPLOY. REPORT   NO REPORT FROM EMPLOYER.
4  16+ INTENTIONS   SIXTH FORM
5  CAREER AIMS      RETAIL MANAGEMENT.
6  CAREERS INTER
7  OPTION 1         ENGLISH
8  OPTION 2         BIOLOGY
9  OPTION 3         FREN
10 OPTION 4         HIST
11 OPTION 5         GEOG
12 CAR STAFF A
13 CAR STAFF B
14 CAR STAFF C
```

```
PROFILE  RECORD 123
*******************
1  ATTENDANCE       Good.
2  PUNCTUALITY      As I live near school I am never late.
3  APPEARANCE       I like to be neat and tidy
4  WITH OTHERS      I think I am easy to get on with.
5  INITIATIVE       I tend to try things myself. If I can't do it then I will as
 a teacher.
6  ENTHUSIASM       If I like what I am doing I try to do it well.
7  LEADERSHIP       I enjoy being in charge and taking responsibility.
8  RECEPTIVENESS    I hope I am receptive to others views.
9  FLEXIBILITY      I find that my views often modify with discussion.
10 OPENESS          I try to have an open mind and listen to other points of vi
11 WITH PEERS       I get on well with other pupils.
12 WITH ADULTS      I get on well with my parents and most adults.
13 PUPIL USE A
14 PUPIL USE B
15 PUPIL USE C
16 PUPIL USE D
17 PUPIL USE E
```

HALF HEIGHT WINCHESTERS



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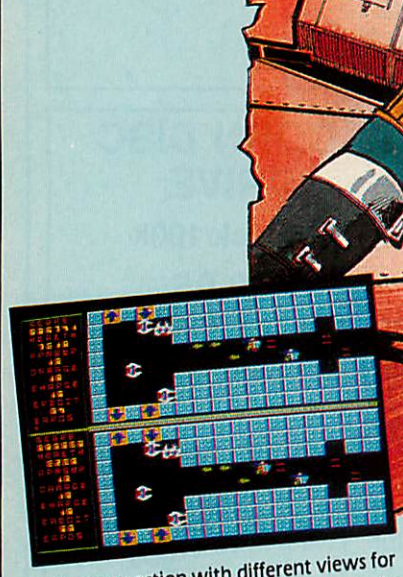

Split-screen action with different views for each player. When you are both in the same area the views are the same.

Crack the code to the forcefield, pass through the portals to raid the area of valuable credits, then head for the lift.

Now *TWO* can play – and experience . . .

THE CHALLENGE OF A LIFETIME!

Starship Icarus is plummeting towards the sun, and the only hope of averting the impending cataclysm is for you to teleport on board, disable the master computer and regain control . . .

This spectacular fast-action game has a unique split-screen which means that one player can complete the game on his own – or play simultaneously with a friend – to fight the trigger-happy droids which infest the ship. With 20 levels of nerve-racking excitement, forcefields, mines, electronic doors, emergency lifts, movable walls, and opportunities to build up your armour, blaster and health ratings, this is one game you won't complete in a few weeks!

There can be no doubt that Icarus, with its incredible one- or two-player action, is one of the most exciting games ever created for the BBC Micro and Electron.

Check it out for yourself – and take up the challenge!

Icarus is the result of six months' intensive work by Powerhouse Software, the programming team which developed the top-selling Dunjunz. A full three months has been spent play-testing and fine-tuning to produce an addictive challenge with a gameplay that's really out of this world!

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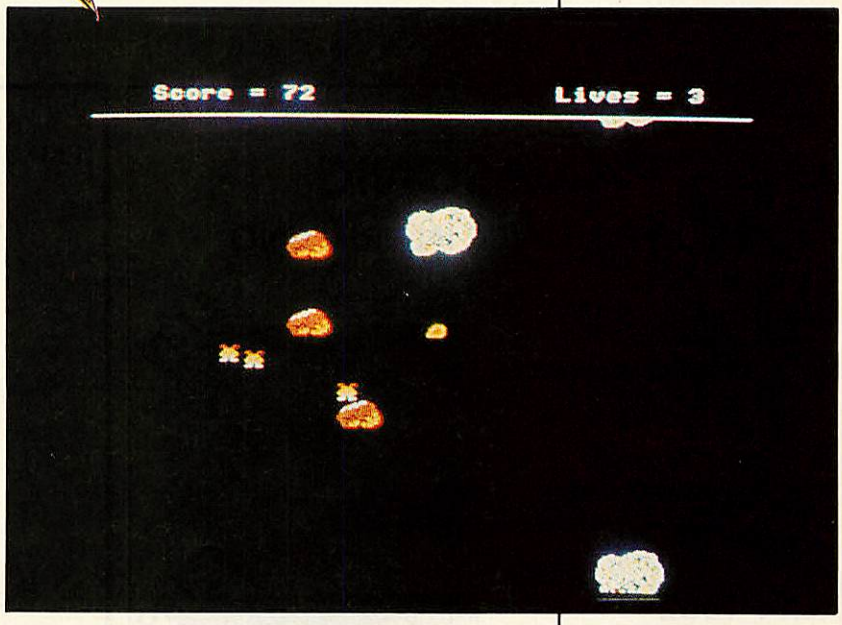
B B+ M

Attack of the Beastiroids

Fight for your life in Simon Bartrum's fast action shoot-'em-up in the lethal Asteroid Belt



FAR out in the rock-strewn reaches of the Asteroid Belt you are plying your quiet trade as a humble miner. As you work your way through a rich vein of meteors you fire your mining laser and a nugget splits with a satisfactory explosion.

As the gases dissipate you see something moving at the heart, a thing you thought only lived in old miners' horror stories – a Beastiroid!

Quickly you scan the heavens. All around you you can see asteroids that have been hit by your pulsed laser cannon beginning to break up, and swarming from the broken shells come more Beastiroids. The vicious little creatures begin to move towards your ship and you remember the tales of ships being eaten into dust by these voracious Belt dwellers – creatures that eat the best ore from the hearts of asteroids.

You jump for your laser cannon once more preparing to fight to the end to protect your ship and cargo. But every stray shot releases yet another of these deadly creatures from its rocky home. How long can you survive? In the words of the old asteroid miner's parting shot: "Don't get bitten by the Beasties!"

Before each game you can enter the number of asteroids you want to start with and how fast they should move. When you are ready press S to start. Each time your ship is hit and destroyed you lose one life. Press S to start again when space around you is clear. Your mining ship controls are:

Caps Lock	Rotate ship anti-clockwise
Control	Rotate ship clockwise
]	Energise short burn thrusters
Return	Fire pulsed laser cannon
Spacebar	Initialise hyper-hop

```
   10 REM Beastiroids
   20 REM by Simon Bartrum
   30 REM (c) The Micro User
   40 PRINT"Relocating...";:*FX18
   50 IF PAGE>&E00 THEN*KEY0"*TAPE|MFORT
%=PAGE TO TOP+4STEP4:!(&E00+T%-PAGE)=!T%
:NEXT|MPAGE=&E00|MOLD|M"
   60 *FX138,0,128
   70 *K.1DELETE10,90|MGOTO690|M
   80 *FX138,0,129
```

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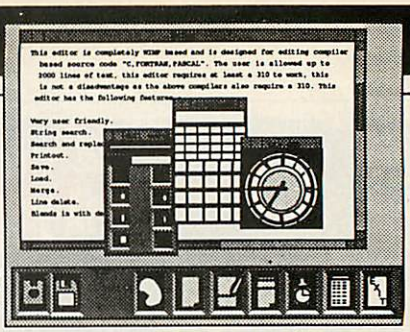

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This software is an enhanced desktop for the Archimedes ((C) Acorn computer Ltd) , and has the following functions:-
SCIENTIFIC CALCULATOR, A 30 function scientific calculator with a facility for number conversions.
CLOCK, A clock with a difference ! . Big ben digitised and incorporated in the archimedes desktop.
DIARY, Same design and function as Acorns standard diary.
NOTEPAD, An improved version of Acorns notepad, with direct pointer driven input.
PALETTE, A Palette of the same design as the Acorn Palette.
BBC CONVERTOR, This program blends into the desktop, when a RS232 lead has been connected between the BBC and the Archimedes select the 5.25' disk icon and a window showing the files on the BBC B disk drive appears on the archimedes. To load files just select them with a mouse (as many as you want) , and from the desktop menu select load to make the files transfer automatically from the BBC to the archimedes. The baud rate is set at 19200 baud although any speed can be used, the Convertor is intelligent and recognises automatically the file types contained on the BBC's disk drive.
EDITOR, This is an optional facility for editing source text files for compilers (FORTRAN, C, PASCAL etc), to work it must be used on at least a 310 (this is not a disadvantage as none of the compilers are able to work on a 305). This advanced program blends fully into the desktop enviroment, and is very user friendly and intuitive in its use, the maximum text size is 2000 lines. The files produced are compatible with twin, it is entirely WIMP driven and needs no control/function keys.
The basic editor functions included are string search, search and replace, load, save, merge, print, clear.

"This kit from Brainsoft can be thoroughly recommended" from review in Archive magazine December 1987.

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SIDEWAYS RAM UTILITIES BBC B,B+,MASTER

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-ADVANCED ROM FILING SYSTEM provides the user with fast access to programs and data, so fast that it can load a 20K program quicker than the BBC's CLS command takes to clear the memory. The ARFS is capable of storing files longer than 32K in length, the amount of file space is limited to the number of sideways ram the user has, the number of files, length of names being limited by only the ram size. The ARFS when enabled by *RFS acts like a disk interface allowing saves and deletions, as well as loading, many programs which use 'legal' disk calls are compatible.
Also provided on the disk are three BASIC programs which can be easily adapted to run on NETWORK systems, ramload, ramsave and ramlist.
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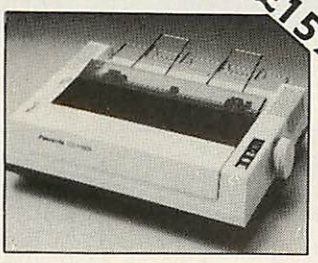

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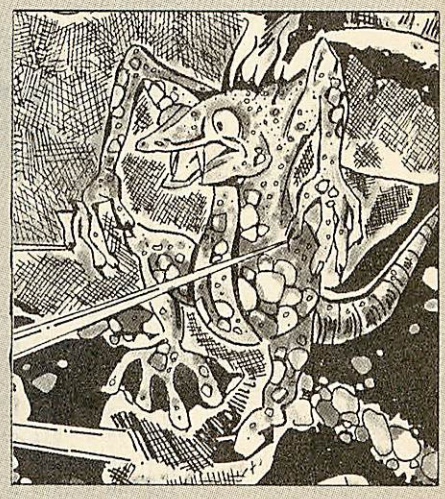
```
  90 VDU21:END
 100 DIM SC%(9),N$(9)
 110 L%=5:rsp=6:GOSUB600
 120 RESTORE 140:Naddr=&700
 130 FORT%=1TO9:READ N$(T%):SC%(T%)=(10
-T%)*100:NEXT:SC%(1)=1235
 140 DATA Barty (Author),Roger Dodger,T
iny Tim,Metal Marvin,Viking Rangers,Ches
hire Champ,Barmy Boris,Slartibartfast,Za
nny Zaphod
 150 sc%=0:*FX214,1
 160 MODE1:PROCc
 170 FORT%=1TO9:IFsc%<SC%(T%) NEXT:GOTO
190
 180 FORS%=9TOT%+1STEP-1:SC%(S%)=SC%(S%
-1):N$(S%)=N$(S%-1):NEXT:SC%(T%)=sc%:N$(
T%)=STRING$(13," "):N%=T%:sc%=-1:T%=9:NE
XT
 190 COLOUR1:PRINTTAB(9,2)"Beastiroids
Top Scores"
 200 COLOUR2:PRINTTAB(8,3)"============
============"
 210 FORT%=1TO9:COLOUR2:PRINTTAB(0,4+T%
*2);T%;".";:COLOUR3:PRINTN$(T%);:COLOUR1
:PRINTSTRING$(15-LEN(N$(T%)),".");SC%(T%
):NEXT
 220 RESTORE 250:COLOUR1
 230 PRINTTAB(27,6)"KEYS":COLOUR2
 240 FORT%=9TO17STEP2:READA$:PRINTTAB(2
2,T%)A$;:NEXT
 250 DATA"  CAPS..Turn Left","  CTRL..T
urn Right","     ]..Thrust",Return..Fire
," Space..Hyperspace"
 260 *FX15
 270 IFsc%=-1 PRINTTAB(10,26)"Enter you
r name":VDU31,2,4+N%*2:A%=0:X%=&A7:Y%=&2
A:CALL&FFF1:N$(N%)=$&700:GOTO150
 280 PRINTTAB(10,26)"Press SPACE to pla
y"
 290 FORT%=0TO?nor:?(r+T%*6)=?(r+T%*6)O
R128:NEXT
 300 REPEAT:*FX19
 310 CALL&2BCB:UNTILINKEY-99
 320 CLS:REPEAT:PRINT"Number of Rocks (
1-10)?":INPUTL%:UNTILL%>0ANDL%<11
 330 REPEAT:PRINT"Speed 1(FAST)-10(SLOW
) ":INPUTrsp:UNTILrsp>0ANDrsp<11
 340
 350 *FX144,0,1
 360 GOSUB600:MODE1:PROCc
 370 MOVE0,960:DRAW1280,960
 380 f%=0:lv%=3:sp%=5
 390 PRINTTAB(4,0)"Score = 0"
 400 PRINTTAB(28,0)"Lives = ";lv%
 410 IFlv%=0THEN160ELSECALL&2AAC
 420 COLOUR2:PRINTTAB(15,0)"S to start"
 430 REPEAT:CALL&2BCB:PROCw:UNTILINKEY-
82
 440 COLOUR3:PRINTTAB(15,0)SPC10
 450 ?&80=RND(255):?&81=RND(&45)+&35:CA
LL&2AD1
 460 IF?&7D>0 sc%=sc%+?&7D:PRINTTAB(12,
0);sc%
 470 PROCw:IF?&7C>0 PROCdie
 480 IF?&79=0 lv%=lv%-1:GOTO400
 490 IF?&77=0ANDf%=0THEN450
 500 IFf%=0 f%=60
 510 f%=f%-1:IF f%>0THEN450
 520 IF L%<10 L%=L%+1ELSEIFrsp>1THENrsp
=rsp-1ELSEIFsp%>0 sp%=sp%-1
 530 GOSUB600:GOTO450
 540 DEFPROCw:REPEAT
 550 UNTIL TIME>sp%:TIME=0:ENDPROC
 560 DEFPROCc:VDU23;8202;0;0;0;:ENDPROC
 570 DEFPROCdie
 580 SOUND&10,-10,5,20:*FX19
 590 VDU19,0,?&79 AND 1;0;0;:ENDPROC
 600 r=&900:nor=&71
 610 ?&77=0:?&70=0:?nor=L%*6
 620 FORT%=0TOL%:TT%=r+T%*6
 630 n%=&29E0+RND(15)*2
 640 D%=?n%+256*(n%?1)
 650 TT%?0=140:TT%?1=1
 660 TT%!2=D%:TT%?4=0
 670 TT%?5=(RND(16)-1)*16+RND(rsp+1)+rs
p/3
 680 NEXT:RETURN
 690 ENVELOPE1,132,-2,-2,0,50,50,50,127
,-10,-10,-10,126,0
 700 VDU6:MODE1:PROCc
 710 PRINTTAB(10)"Creating Ships"
 720 RESTORE940:PROCread(&287F,0)
 730 RESTORE1190:PROCread(&2AAC,128)
 740 FORT%=0TO8:FORS%=0TO5
 750 ?(&4000+S%*8+(T%DIV8)*640+T%MOD8)=
?(&287F+S%+T%*6)
 760 NEXT:NEXT
 770 FORT%=0 TO 44 STEP 4
 780 FORS%=44 TO 0 STEP-4
 790 GCOL0,POINT(560+S%,828-T%)
 800 PLOT69,652-T%,784+S%
 810 NEXT:NEXT
 820 x%=512:y%=828:m%=656:n%=828
 830 FORA%=1TO9
 840 FORT%=y% TO y%-44 STEP-4
 850 FORS%=x% TO x%+44 STEP 4
 860 GCOL0,POINT(S%,T%)
 870 PLOT69,m%+44+T%-y%,n%-(S%-x%)
 880 NEXT:NEXT:x%=x%+48:m%=m%+48:NEXT
 890 FORA%=0TO11:D%=&4000+A%*24
 900 !&9D=D%:CALL&2E9F:NEXT:*FX15
 910 *K.0DELETE690,1860|MOLD|MRUN|F|M
 920 *FX138,0,128
 930 VDU21:END
 940 DATA<3\#A<3\<<L4<<5l<<3l4<<4R<<5?4
 950 DATA<L4R4<L4C4<LK4<LK4<LK4<LK4<L4R
 960 DATA4<L4R4<<5l<<5l<DD?3=VaL4A5>@5A
 970 DATA5E?5u4al5z5F=5qHN5i4Hp3F3F3>P>
 980 DATAH4<D#@<o5j#A<M5{5{5j<<o<3s5j4D
 990 DATAw<M5{5Y5k4Dos<ow3s5k4d3@5[<3s3
1000 DATAY3@5J\3£3S4D3Q3jM5K5{5H3b5H3c5
1010 DATAH5@5R5H4O3<3@3A4U5y^5^_4T3b5Ij
1020 DATA5Q5U4U3c3X4f5j4J5j5k4d4w4f3^4f
1030 DATA3nM4w3j5Y4T5f5Y5M3P3q4[4<4t3^5
1040 DATAH4D5wo4w<4t5b3s5Yn^^5H5£5HoO5H
1050 DATA5@4U3r3P4D=s4UM<3rM4DM4W5j3s3@
1060 DATA3\5u<o5I<<4<5t4u<^4UT4U3Q3p5b<
1070 DATAo3b3\5s4d3m5H<M3ql4D5z5s<<M5d5
1080 DATAo<o5H<<<5z5H<<o4H<<M5KK<<k4KED
1090 DATAM3KIBD_K=FHCKGBJCFFG3>KHA<GH=?
1100 DATAheC>@N3?>I5>F5??]4C4pJ=KDKDH?>
1110 DATA@l5<3L4\5l5l3l5\^3@5j3s5l3?4lw
1120 DATA5\3g\3B4<3S4Ly3\3D5l{l3z5L3u5L
1130 DATA3D4\3o5L3X4\3lly=<=<n<=<L<5t5{
1140 DATA@<><L<5t5{B<C#b<#A=<#A5{5x5w5z
1150 DATA<>A@A><5z5wLL5Ned3=4Me3<4w5Rd#
1160 DATA@VW]_\#@V]3bc4<c4Vc4pc5Jc5ecFd
1170 DATAid3Id3cd4=d4Wd4qd#D=#D5{5x5y5z
1180 DATA5{<=>?@?>=<5{5z5y<CJ\3v*
1190 DATA^5DB3o\3R@3pe2eA3ue2<A3lA3nA3r
1200 DATAA3qAHA3sA3vA3wA>A3x2\2k2ie2<A3
1210 DATAya3x5L2S2\2?2g2\5@2i2\5G2g2\A2
1220 DATAia3x5l2Pe2HA3r3HA2i5B3u5L2Eb3o
1230 DATA£3pe2H3H2k2i2\5@2i3H5G2g^{2\5=
1240 DATA2g5L2E£3nD2L2>\2G@3r^5z2\5=2g5
1250 DATAL2G£3n5D5<2H5L2>\2<@3r^c2\5=2g
1260 DATA5L2Qb3ry2x2fA3vy3D2fA3we2FA3ze
1270 DATA2=2\J2j^r2\5=2g5l2Be2<A3t5l30a
1280 DATA3t5L3K^2<£3ry2W2f5L2yedY2W2fA3
1290 DATAtBLb3o£3pa3qA[e2=2\2y2je2A2\3_
1300 DATA2jFbLY2T2fTY2U2ff3ru2x2fY2X2fu
1310 DATA3D2fY2Y2faLY2V2fe2<3HJ2jF2T3e2
1320 DATABf5E2Z5Lq^Y2\5=2g5L2^b3o£3pa3n
```



```
1330 DATA2\2k2i£=@3pa<2e5tA3ofa3n3H2k2i
1340 DATA\5{e=2\5p5{5\5{3\b3l2\5o2ga3ld
1350 DATA2T3e2BA3lf5A3mL5lu2<2E5L2AT5L2
1360 DATAEA3me2<A3lA>3\e2AA3s3\y2<2E2L2
1370 DATAC2e3{Y2<2EAH5l5Ey2>2EARAUy2?2E
1380 DATAASAVy2@2EATA[5Z2=2E5L2hy2A2Ed2
1390 DATAe2KY2=2ET#@3FfyS2f3DyC2f3DbU£V
1400 DATA3d2\2y2j3d2\3_2jBU@Vb3l3H3L2ha
1410 DATAH5L2Aa>5L2=3\e2<AJy2<2Efy3L2fA
1420 DATAMy3M2fI2D2iy3N2fI5t2hy302fI5u2
1430 DATAhaH5L3JbRaS£T2\5m2haJ5l3Pa>5l3
1440 DATALe2>2\J2je2<A>b3l2ty2<2EA3y5e2
1450 DATA@Y2<2E5l2s2E<£3mU2<2EY2<2EaRU2
1460 DATA>2EaSU2?2EaTU2@2Ea<2e5l3Y2A2Ef
1470 DATA2e2K5E2>L2=5FFU2A2Ee2=U2=2ET2T
1480 DATA3e2BA3m3\b3laVY2?2E3DaLY2@2Eda
1490 DATAUY2>2Ef3d2\5m2he2<AH3\BYAZ^2<y
1500 DATAUU5l2F3MYMY5E2\5L2>AJ5d5\3_5l2
1510 DATA_T2T3e2Dd5@ML5_5DT2e2Cd5L5XF3D
1520 DATAbY£Z2\3p2jBY@Z3df\2<5l5E3\BY@Z
1530 DATAfx3\2fH3[2i2Ffy3i2fI3I2iy3j2fI
1540 DATA3J2i^2<£3qyUU5l2H3MYMY5l2B5E2\
1550 DATA5l2>AL5d5\3_5l5HT2T3e2Dd5E2TL5
1560 DATAJ5DT2e2Cd5L5VF3DbY£Z2\3p2jBY@Z
1570 DATA3df\2<5l5Ce2<ALa3qALb3o£3pa3n2
1580 DATA\2k2iaL2A3xA3xb3o£3pa3v2\2y2ja
1590 DATA3w2\3_2jB3o@3pa[A3qa3rA3n2\2k2
1600 DATAi5B3z5L2Be2<A3vA3w3\^2<y2W2f5l
1610 DATA3dBLy2Y2f3Dy2X2f3Dy2V2fA[x2U2f
1620 DATA@Zy2T2fAYf3d2\2y2j3d2\3_2jFbLA
1630 DATAUY2T2fTAVY2U2fy2W2f2L2C2e3{Y2W
1640 DATA2f5L2Jx2V2fmY3E2\MY5Z2W2f5l2Z£
1650 DATA[TY2V2fmU3D3E2\MU3d5l2Jy2W2f5E
1660 DATA2cl2CA>e2=Y2W2fF2T3e2Bf5E2Z5LF
1670 DATA3\5l2_2L2M2tF5e2DfL2VD5<2ql2QT
1680 DATA3e3Gd3\2TF3e2DfL2E5D5<<L2@T5e3
1690 DATAGd3\5l5y2T3a[A[2l2O5E2DL5n2e2C
1700 DATAA[2TF3e<fT3e2>d5L5W2e2CA[2tF5e
1710 DATA<fT5e2>d5Lw2F2F2F2T3e2<fe2<3e2
1720 DATAfde2C3H5m5{f2Fdy3\2fI{2ju3i2fI
1730 DATAw2ju3j2fIx2j^2<\2<mYYUU5d5\3_5
1740 DATAl2[T2T3e2Dd5E2TL5i5DT2e2Cd5L5b
1750 DATA2TaY3e<AYaZ3e2>AZ5L5S3\3\mYYyU
1760 DATAU5l5y3@*
1770 DEFPROCread(D%,L%):N%=1:S%=30
1780 P%=FNgtch:IFP%=42 ENDPROC
1790 IF P%>59 THEN1820
1800 IF P%=35 N%=FNgtch-60:GOTO1780
1810 P%=(P%-50)*64+FNgtch-L%
1820 FOR T%=1 TO N%:?D%=P%-60+L%
1830 D%=D%+1:NEXT:N%=1:GOTO1780
1840 DEF FNgtch:S%=S%+1
1850 IF S%=31 READ A$:S%=1:VDU46
1860 =ASCMID$(A$,S%)
```

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GAME

◀ *From Page 87*

```
10 =    0 0     280 = DB21 1    550 = A34D 8    820 = 4647 0    1090 =  6B0 1   1360 = B06C 4
20 =    0 0     290 = E4BA 5    560 = F55B F    830 = 1316 5    1100 = 6F02 E   1370 = F33E D
30 =    0 0     300 = 9E1F A    570 = AEA7 2    840 = BC02 0    1110 = 561B 6   1380 = F64F E
40 =  E48 8     310 = DFA9 F    580 =  394 C    850 = 8997 1    1120 = 195B B   1390 = 4E8B A
50 = 6BA4 0     320 = B7B2 4    590 = F073 B    860 = 9388 7    1130 = BB0D 3   1400 = AA3B D
60 = 5DEC A     330 = 70FF 1    600 = 41DF 5    870 = 5D09 2    1140 = 9D06 0   1410 = 25EF 8
70 = 7FD0 2*    340 =    0 1*   610 = 84C0 B    880 =  347 1    1150 = 3C39 A   1420 = 1A9F 9
80 = 4DCD 0     350 = E82A 9    620 = 6AD9 8    890 = AB18 6    1160 = 7903 4   1430 = 5781 4
90 = 7A91 1     360 = FEE8 B    630 = D73D 1    900 = 502B A    1170 = 4343 5   1440 = EE2A B
100 = B3D6 C    370 = 6D1B D    640 = 1316 2    910 = 1D1F 7    1180 = E0D0 C   1450 = BD79 9
110 = 5B71 5    380 = 7B5D 1    650 = 38FB A    920 = 5DEC F    1190 = 4BF4 6   1460 = 5C46 2
120 =  91E 9    390 = D35E 1    660 = 22DC 0    930 = 7A91 8    1200 =  CEC A   1470 = EA72 A
130 = 9B6B 7    400 = 2E3D 5    670 = 723D B    940 = 951B A    1210 = 66E0 3   1480 = 844E 3
140 = 5EE9 B    410 = D6CA A    680 = 6629 F    950 = 79E6 E    1220 = E658 3   1490 = 8641 5
150 = C259 1    420 = 2D29 0    690 = 7718 A    960 = 445A 7    1230 = 3E86 B   1500 = 2A2D 1
160 = A6AC D    430 = 27A9 4    700 = 5E71 C    970 = F0FC 8    1240 = 6094 1   1510 = 4BB7 D
170 = 6482 4    440 = C7B9 6    710 = 8E2B F    980 = ACEF 9    1250 = 76CF 9   1520 = 184A 4
180 = 413E 7    450 = FEF6 7    720 = 7F5E 8    990 = AF68 7    1260 = B11D 0   1530 = 493A F
190 = C905 E    460 =  7CD 0    730 = 1CB9 9    1000 = 6870 5   1270 = 4DA1 C   1540 =  FC5 0
200 = CE0A 8    470 = FA5F B    740 = B308 7    1010 = 7DA0 0   1280 = 85E4 4   1550 = 799C B
210 = 6B5E D    480 = 12D9 1    750 = 7867 D    1020 = 4B95 0   1290 = DE57 5   1560 =  473 0
220 = 1879 4    490 = 286E C    760 = 24BD F    1030 = E331 F   1300 = E4FF F   1570 =  4A0 E
230 = 66FE 5    500 = 9BDB D    770 = 29F5 4    1040 = 406E 3   1310 = E9CA 3   1580 =  AF1 3
240 = 9DE0 4    510 = B5AC E    780 = B366 A    1050 = 44A5 B   1320 = 8169 A   1590 = FC1B 1
250 = 7C5E D    520 = D451 A    790 = 96DF F    1060 = 567A 4   1330 = 465B F   1600 = E17E C
260 = A022 1    530 = D041 7    800 = 1A21 3    1070 = C678 B   1340 =  AF1 6   1610 = 2BDD C
270 = 1378 3    540 = 6CC1 3    810 = 24BD 1    1080 =  6B7 2   1350 = 3AF0 7   1620 = 590C 1
```

Get it right!

```
1630 = 954B 3
1640 = 471D 8
1650 = 1D3A B
1660 = E700 4
1670 = 567A 7
1680 = 2634 6
1690 = BED2 5
1700 = C13A 4
1710 = 40F5 6
1720 = ABE1 1
1730 = 17BB 1
1740 = E6B8 3
1750 = 339C F
1760 = 7B24 C
1770 = CB5C 1
1780 = E63E 1
1790 = E59E 2
1800 = 8F10 2
1810 = 6E3A 6
1820 =  544 A
1830 = 9826 5
1840 = 99DB 8
1850 = F0C1 D
1860 = FED0 8
```


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Orders normally despatched within 24 hours, but allow 7 days. All titles subject to availability.

B B+ hm

Graphics in shadow

Mark Fishpool demonstrates how to produce surface displays with depth

PRODUCING three-dimensional landscapes on a flat screen is relatively simple but requires a lot of processing power – number crunching. The Shades program listed here allows you to generate in a short time effective images based on simple mathematical functions.

Type in the program and ensure you've made no errors using Get it Right!, save and then run it. It takes about 15 minutes to build up the complete screen on a standard BBC B and can create some very interesting effects since it shades the surface correctly to give the effect of light coming from a particular direction. You can alter the direction of the light source by adjusting *ltx%*, *lty%* and *ltz%*.

The three dimensional surface calculation is the less complicated part of the display algorithm. It scans over a defined range of the two independent variables *x* and *y*, then calculates *z* values according to the equation given in *T$*.

The value of *z* can also be calculated from *r*, which is the distance of the current point from the centre of the grid, and it produces circular patterns when used. Suitable equations would be:

```
COS(x*2)*8+SIN(y)*7
8/r
x+y/2-2
(8-r)*6
```

Shading the graph is more complicated, and is done using a useful mathematical trick: Each time a *z* value is calculated it is stored in the array *nd%()*. For the first line no points are plotted, but after it is calculated all *nd%()* is transferred to *cd%()*.

When the second point on the next line has been calculated the program has four corners of a square for every point – the current point being one corner. The routine FNcol takes these four corners and finds vectors of the diagonals. Then scalar (dot) products are found between these and the light direction vector. A scalar product is calculated by:

```
(x1,y1,z1).(x2,y2,z2)
 = x1*x2+y1*y2+z1*z2
```

or:

```
(x1,y1,z1).(x2,y2,z2)
 = SQR(x1*x1+y1*y1+z1*z1)
   *SQR(x2*x2+y2*y2+z2*z2)*COS(an)
```

where *an* is the angle between the vectors. So the angle between any two vectors can be found using this method:

$$an = ACS\left(\frac{x1*x2+y1*y2+z1*z2}{SQR(x1*x1+y1*y1+z1*z1)*SQR(x2*x2+y2*y2+z2*z2)}\right)$$

The resultant two angles are multiplied

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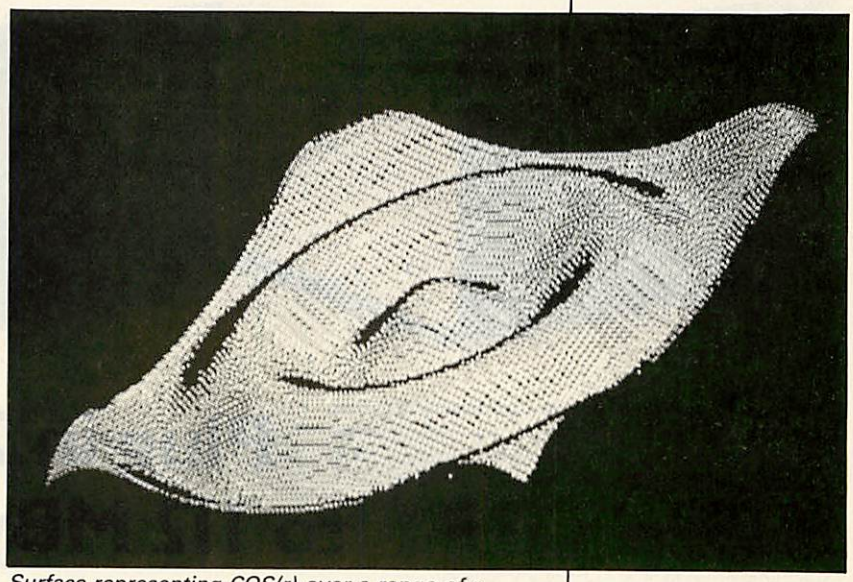
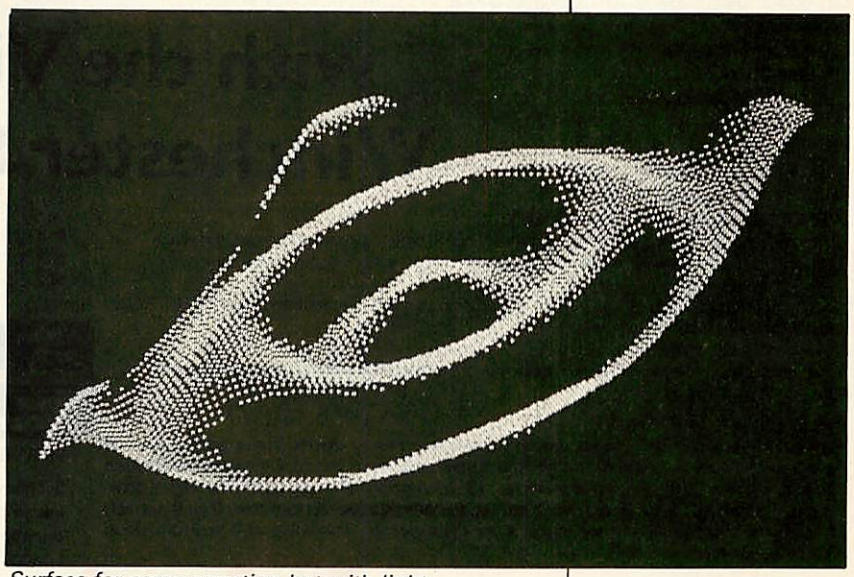


Surface representing COS(r) over a range of r from 0 at the centre to about 7 at the edge



Surface for same equation but with light source coming from a different direction

MEGA BYTES FOR MINI BUCKS

NEW LOWER PRICES

Picture shows 20 and 28 megabyte units. 40 and 56 megabyte units may be slightly taller in size.

Plug in 20 to 112 MBytes of extra storage with the Viglen Winchester System

If you want to increase your storage capacity up to an incredible 112 MBytes you need a Winchester; but not just any Winchester ... the new Viglen System is 100% compatible with the Acorn Winchester, it's simplicity itself to install and it costs a lot less than you think.

The Viglen Winchester is ready to plug straight into your BBC Master or if you have a B or B plus you will simply have to fit an ADFS ROM. You can use up to two floppy disk drives in conjunction with the unit and, fitted to the B+ or Master, the floppies can double their capacity by running in double density mode.

The 112 MBytes Viglen Winchester System is equivalent in capacity to over 1000 100K floppies or 250 400K floppy disks. It takes under 2.5 seconds to save 200K bytes, making it at least ten times faster than the equivalent floppy disk options. The system is designed for virtually every application from education or business to home use.

ALL MODELS AVAILABLE FOR USE WITH S.J. RESEARCH FILE SERVER AT NO EXTRA COST – *PLEASE SPECIFY WHEN ORDERING.*	PRICE INC V.A.T.
Drive 0 Single	
VB20 20M Winchester	499.00
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VB40 40M Winchester	799.00
VB56 56M Winchester	899.00
Drive 1 Second Drive	
VB120 20 M Drive 1 Winchester	479.00
VB128 28M Drive 1 Winchester	499.00
VB140 40M Drive 1 Winchester	739.00
VB156 56M Drive 1 Winchester	769.00
Acorn ADFS ROM with utilities (essential for BBC B and B Plus)	29.95
Acorn 1770 upgrade kit (BBC B)	49.95

WHAT DO I GET FOR MY MONEY

1. Winchester Unit – (winchester drive, controller boards, power supply and fan all fitted in one compact case). The fan is recommended in order to keep the winchester at the correct operating temperature.
2. Master Reference manual part 1 (for a BBC B or B plus you will require the Acorn ADFS ROM and utilities available at an extra cost).
3. Winchester user guide.
4. Additional utilities on the winchester including formatter, verifier, ADFS menu and backup program.

PLUG IN SECOND DRIVE

The Acorn ADFS can handle up to two winchester drives. These are accessed as drive 0 and 1 (the floppy disk drives being accessed as drives 4 and 5). Viglen winchesters are supplied as Drive 0 (single unit) and Drive 1 (Second drive for single unit). The Viglen drive 1 can be instantly plugged into drive 0 and used either as a backup for Drive 0 (and perhaps taken off and stored away) or for more online mass storage. This will enable you to back up 20 Megabytes in under 7 minutes.

STORAGE OPTIONS:-

Drive 0	Drive 1	Total Capacity
20 Meg	20 or 40 Meg	40 or 60 Meg
28 Meg	28 or 56 Meg	56 or 84 Meg
40 Meg	20 or 40 Meg	60 or 80 Meg
56 Meg	28 or 56 Meg	84 or 112 Meg

COMPATIBILITY?

Viglen winchesters are 100% compatible with the Acorn winchesters and the ADFS. Any program that will run on the Acorn winchester will also run on the Viglen winchester. The winchesters also run with the Acorn Master 512 board with DOS plus (CPM86 and MSDOS compatible operating system).

BACK OF UNIT

1 MHz IN: This socket is used to connect the micro to the winchester.
1 MHz OUT: This socket is used to connect any other device that is normally plugged into the 1 MHz bus on the micro.
DRIVE 1 DATA: This is a 20 way socket which is used to connect the data signals to a second winchester drive.
DRIVE 1 CONTROL: This is a 34 way socket which is used to connect the control signals to a second winchester drive.

HOW TO ORDER

Simply write off today to Viglen and remember to add £8.00 carriage, packing and insurance, and allow 7 days for delivery. Credit card holders may order by telephone. If you'd like to find out more why not come down to our West London showroom (see map for directions) or if you can't make it simply ask for our special datasheet.

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Unit 7, Trumpers Way, Hanwell, London W7 2QA. Sales Hotline 01 843 9903.

Prices correct at time of going to press and subject to availability.

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together to form a shading value. User-defined characters are set up for the shades of grey and printed at the graphics cursor. A form of hidden line removal is achieved by first blanking the space to be plotted and always working from back to front on the surface.

ROUTINES

vdu	Defines the shading characters
plot	Shades a point on the surface
col	Calculates the shading value for a point

VARIABLES

ltx%,lty%,ltz%	Direction – not position – of incoming light
np%	Size of surface
s%	Distance between points plotted
T$	Equation relating *z* with *x* and *y*, or *r*
nd%(),cd%()	Store of points for gradient calculation
v%	Angle of third dimension
wx%,wy%	Screen origin – similar to VDU 29
lx%,ly%,hx%,hy%	Upper and lower limits of curve plotting
lz%,hz%	Limits of z coordinates, used for scaling
dx,dy,dz	Scaling constants
x%,y%	Independent variables
z%	Dependent variable
r	Parameter which can be used in equation
x,y	Values used to calculate *z*
z1%	Old *z* coordinate
col%	Determines shading
xs%,ys%	Calculated 2D coordinates
xc%,yc%,zc%	Vector across one diagonal of the square
xh%,yh%,zh%	Vector across the other diagonal
ann%,ano%	Angles between the two vectors and the light vector

```
   10 REM Curved Surfaces
   20 REM Mark Fishpool
   30 REM (c) The Micro User
   40 ON ERROR MODE7:REPORT:PRINT" at ";
ERL:END
   50 MODE 0:PROCvdu
   60 ltx%=-1:lty%=1:ltz%=-1
   70 sr=SQR(ltx%*ltx%+lty%*lty%+ltz%*lt
z%)
   80 np%=790:s%=12
   90 DIM nd%(np%/s%+1),cd%(np%/s%+1)
  100 v%=50:cv=COSRAD(v%):sv=SINRAD(v%)
  110 T$="COS(2*r)*8"
  120 wx%=0:wy%=200:lx%=0:ly%=0
  130 hx%=10:hy%=10:mx%=(lx%+hx%)/2
  140 lz%=0:hz%=150:my%=(ly%+hy%)/2
  150 dx=(hx%-lx%)/np%:dy=(hy%-ly%)/np%
  160 dz=(hz%-lz%)/np%
  170 FOR y%=np% TO 0 STEP-s%
  180 FOR A%=1 TO np%/s%:cd%(A%)=nd%(A%)
:NEXT
  190 FOR x%=0 TO np% STEP s%
  200 x=x%*dx+lx%:y=y%*dy+ly%
  210 r=SQR((mx%-x)*(mx%-x)+(my%-y)*(my%
-y))
  220 z%=EVAL(T$)/dz:nd%(x%/s%)=z%
  230 IF x%=0 OR y%=np% ELSE PROCplot(x%
,y%,z%)
  240 z1%=z%:NEXT:NEXT:VDU4:END
  250 DEFPROCplot(x%,y%,z%)
  260 col%=FNcol(x%,y%,z%,x%-s%,y%,z1%,x
%-s%,y%+s%,cd%(x%/s%-1),x%,y%+s%,cd%(x%/
s%))
  270 col%=col%/2.22
  280 xs%=wx%+x%+y%*cv:ys%=wy%+z%+y%*sv
  290 MOVExs%,ys%:GCOL2,0:VDU137:GCOL0,3
:MOVExs%,ys%:VDU128+col%
  300 ENDPROC
  310 DEFFNcol(a1%,b1%,c1%,a2%,b2%,c2%,a
3%,b3%,c3%,a4%,b4%,c4%)
  320 xc%=a1%-a3%:yc%=b1%-b3%:zc%=c1%-c3
%
  330 xh%=a2%-a4%:yh%=b2%-b4%:zh%=c2%-c4
%
  340 ann%=DEG(ACS((xc%*ltx%+yc%*lty%+zc
%*ltz%)/(SQR(xc%*xc%+yc%*yc%+zc%*zc%)*sr
)))
  350 ano%=DEG(ACS((xh%*ltx%+yh%*lty%+zh
%*ltz%)/(SQR(xh%*xh%+yh%*yh%+zh%*zh%)*sr
)))
  360 IF ann%>90 ann%=180-ann%
  370 IF ano%>90 ano%=180-ano%
  380 =ann%*ano%/405
  390 DEFPROCvdu:VDU23,128,0;0;0;0;
  400 VDU23,129,0;0;0;0;0,128
  410 VDU23,130,0;0;0;0,64,0,128
  420 VDU23,131,0;0;0;0,64,128,32
  430 VDU23,132,0;0;0;0,160,32,64
  440 VDU23,133,0;0;0;0,160,32,160
  450 VDU23,134,0;0;0;0,160,96,160
  460 VDU23,135,0;0;0;0,192,96,160
  470 VDU23,136,0;0;0;0,192,192,160
  480 VDU23,137,0;0;0;0,224,224,224,5
  490 ENDPROC
```

```
  10 =    0 0 | 180 = 2126 9 | 340 = 570A C
  20 =    0 0 | 190 = 3FBA A | 350 = 40A6 9
  30 =    0 0 | 200 = 1F20 E | 360 = ED44 C
  40 = 693D D | 210 = 82EF 2 | 370 = D823 E
  50 = 5CFD B | 220 = A756 5 | 380 = CA51 F
  60 = ADD8 F | 230 = A453 1 | 390 = 5F25 C
  70 = 16F9 D | 240 = 96F1 1 | 400 = 5DA3 1
  80 =  48C 8 | 250 = CE3B 7 | 410 = DC92 9
  90 = 2595 D | 260 = AAB5 D | 420 = 67BF 3
 100 = 6A78 A | 270 = 7CFF 6 | 430 =  48A 5
 110 =  54F 8 | 280 = 76E3 0 | 440 = EF14 3
 120 = B4B0 D | 290 = 801B 4 | 450 = 10C5 9
 130 = BD78 0 | 300 = ED0F 0 | 460 = F706 4
 140 = 2067 1 | 310 = F46B 1 | 470 = 4DE0 5
 150 = C9F2 E | 320 = FC04 6 | 480 = F47E 7
 160 = F8A0 8 | 330 = B3CF E | 490 = ED0F 7
 170 = C5DC 0 |
```

Compatibility

This version of Shades works on the BBC B, B+, Master series and Archimedes. There is also a specially enhanced Archimedes version of the program on the 3.5in monthly disc.

TECHNOMATIC

BBC COMPUTERS & ECONET CENTRE
17 Burnley Road, London NW10 1ED Tel: 01-208 1177 Fax: 01-452 1500
305 Edgware Road, London W2 Tel: 01-723 0233 Telex: 922800

ARCHIMEDES

300 & 400 SERIES

Archimedes 305 Basic	£699(a)
Archimedes 310 Basic	£775(a)
Archimedes 310M Basic	£835(a)
Archimedes 410 Basic	£1,399(a)
Archimedes 440 Basic	£2,299(a)
Monochrome Monitor*	£50(a)
PC Emulator Software (when purchased with computer)	£60(d)
Colour Monitor*	£195(a)

*Monitor prices applicable only when purchased with the micro.

ADD-ONS

0.5Mb Ram upgrade kit (for 305)	£89(c)
2nd Floppy drive (for 305, 310 & 410)	£125(b)
Econet Module (with stn set disc)	£43(c)
Backplane for 2 podules	£39(b)
I/O Podule	£79(b)
20Mb Hard Disc + Podule	£499(a)
Acorn Rom podule	£59(c)
CC Rom Podule	£49(d)
Acorn Midi I/O card	£29(c)
IEEE Interface Podule	£283(b)

Full implementation of IEEE std 488 1978 & supp. IEEE std 488A 1980. Full specification on request.

SERIAL LINKS

Arc. to BBC Serial Link (Software for both Arc & BBC)	£25(c)
Arc. to PC/XT (Software for both Arc & PC)	£29(c)
Arc External Drive Adaptor	£25(d)

BOOKS: *(no VAT)*

Arc. Ref Manual	£29(b)
ARM Assy Lang Prog	£12(d)

SOFTWARE:

PC Emulator	£99(d)

LANGUAGES:

ANSI C	£95(c)	ISO PASCAL	£95(c)
Prolog X	£199(b)	FORTRAN 77	£95(c)
LISP	£199(b)	COMAL	POA

PROGRAMMERS TOOLS:

TWIN *Editor*	£29(d)
Toolkit Plus Module	£41(d)
Software Dev T/Box	POA
Software Dev Debug T/box	POA

PRODUCTIVITY TOOLS:

Logistix (incl Spreadsheet, timesheet, d/base & Graphics)	£95(c)

WORDPROCESSORS

First Word	£POA
Graphics Writer	£29(d)
View SKM31 (e)	£49(d)
InterWord (e)	£39(d)

DATABASES

Deltabase	£26(d)
Systems DeltaPlus	£60(d)
Alphabase	£41(d)
Viewstore SKM27 (e)	£52(d)

SPREADSHEET

Viewsheet SKM07 (e)	£52(d)
Intersheet (e)	£39(d)

GRAPHICS & ART

AutoSketch (ARC)	£79(d)
Gammaplot	£30(d)
System Gammaplus	£60(c)
Artisan	£32(d)
Artisan Support Disc	£17(d)
Interchart (e)	£25(d)
Clares Buffer Module	£17(d)

Special Offer

FREE £115 inc vat VOUCHER

with every Archimedes model 310, 410 and 440 purchased from us.
This voucher can be redeemed against any future purchase made from us.
Additionally we will offer discounts upto 10% on Archimedes software and upto 5% on Archimedes hardware stocked by us to all purchasers of Archimedes computers.
This is a limited period offer so do not miss your opportunity for a bargain not to be repeated.

ACCOUNTING SOFTWARE

Minerva's suite 5 Modules (ea) £54(d)
Order Processing, SalesLedger, StockManager, Purchase Ledger & Nominal Ledger

GAMES:

ZARCH	£17(d)
Minotaur	£11(d)

Software packages marked with (e) run under 6502 emulated mode.

Please check on availability of some of the above packages

FILE STORE

Acorn's new file server system

Filestore E01	£825(a)
Filestore E02	£699(a)

Full details on request

ECONET ACCESSORIES

Econet Starter Kit	£85(b)	Econet Bridge	£174(b)
Econet Socket Set	£29(c)	Printer Server Rom	£41(d)
File Server Level II	£75(b)	10 Station Lead Set	£26(d)
Master FS Utility Disc	£17.25(d)		

ECOLINK

Ecolink allows you to connect a PC/XT or AT to an econet network. Supplied complete with comprehensive manual, software and cable.
Full spec on request £299(b)

UPGRADE KITS

1.20S ROM	£15(d)	ADFS ROM	£26(d)
DNFS ROM	£19(d)	1770 DFS Kit	£43.50(d)
BASIC II ROM	£22.50(d)	Econet Kit	£55(d)

EPROMS/RAMS

2764-25
27128-25 (12.5V Vpp)
27128-25 (21.0V Vpp)
6264LP-15
27256
27512

All prices on application

MASTER SERIES

AMB15 Master 128K £356(a)
Includes *free* Educational/Fun software bundle from BBC Publications range (RRP £40) and a STARdataBASE package worth another £40.
AMC06 Turbo 65C102 Module £95(b)
ADC08 512 processor £185(b)
includes MS-DOS and GEM Suite

ADF10 Econet Module	£40(c)	Acorn Rom Cartridge	£13(d)
ADJ22 Ref Manual I	£14(c)	ADJ23 Ref Manual II	£14(c)
View User Guide	£8.50(d)	V/sheet User Guide	£8.50(d)
TRC2 2ROM Cartridge	£7.50(d)	TRC4 4ROM Cartridge	£11(d)
TRC32 32K RAM Cart.	£29(d)	Master Dust Cover	£4.75(d)

Acorn 32016 Co Processor	£949(a)
Acorn X25 Gateway	£2175(a)
Acorn IEEE Interface (for B, B+ Master)	£265(b)
Universal CoProc Adapter	£69(b)

Send for detailed list of DOS software for 512

MASTER COMPACT

All Compact systems come complete with 128K of RAM, 640K 3.5" double sided drive and educational software. Additionally we include our Education/Fun software bundle to the package.

SYSTEM 1 Entry system	£310(a)
SYSTEM 2 with 12" Hi Res Mono Monitor	£365 (2xa)
SYSTEM 3 with 14" Med Res Col Monitor	£475 (2xa)
Compact 2nd Drive Kit	£95(c)
Serial Kit	£25(d)
TV Modulator	£26(c)
Mertec Adapter (upgrades Compact to almost Master level)	£35(c)
External Drive adapter Cable	£9(d)

Z88 PORTABLE MICRO

A lightweight compact micro that can be carried in a brief case. Software available for transferring data to BBC and PC systems.

Z88 Micro c/w rechargeable batteries	£239(a)
Mains Adaptor	£8.65(d)
NiCad Rechargeable Battery	£2(d)
32K RAM or Eprom Pack	£17.35(d)
128K Ram or Eprom Pack	£43.40(d)
Z88 BBC Link with software	£21.70(d)
Parallel Printer Cable	£24(d)
Serial Printer Cable	£8.65(d)

SANYO CRT 70

14" Hi Resolution RGB Monitor
includes lead for BBC
£209
RRP £429 12 months Warranty

CANON PW1080 Printer

includes lead for BBC
£199(a)
12 months Warranty

RAM/ROM EXPANSION

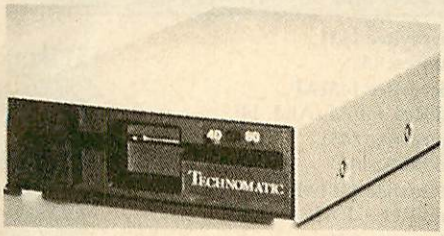
ATPL Board for Model B. Simple to instal, no soldering. Allows expansion to 15 Roms +2*8K RAMS £37(c)
ATPL Battery backup kit £18(d)
ATPL Board for BBC+ £31(c)

All prices ex VAT and subject to change without notice.

TECHNOMATIC

17 Burnley Road, London NW10 1ED Tel: 01-208 1177

TECHNOMATIC DISC DRIVES



TS 400

A range of high quality high performance drives to meet the needs of all BBC Micro Users.

All drives fitted with high quality, slim line Mitsubishi drive mechanism and necessary cables.

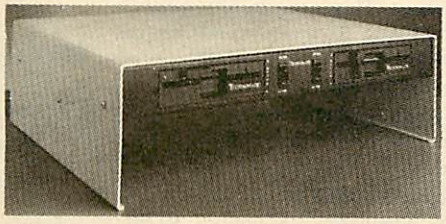
*All drives are fitted with high quality slim line ultra low power mechanisms capable of single and double density operation and offering fast track access and head setting times. Our confidence in their quality enables us to offer a **two year parts and labour warranty** on these mechanisms without any extra charge.

*5.25" floppy drives are fitted with 40/80 track switches as standard at no extra cost. The switches are located in the front and clearly marked to indicate the status at a glance.

*The mechanisms are set inside attractively styled, sturdy metal casings painted in BBC beige colour.

*All drives fitted with all necessary leads and are ready for operation on unpacking. The drives with the mains power supply are supplied with a mains lead fitted with a suitably fused 13A moulded plug.

*TECHNOMATIC drives stand out from other drives because of the high quality of construction and use of reliable switchmode power supply units on dual drives.



PD 800P

5.25" Single Drives 40/80 switchable:

TS400 400K/640K **£90(b)**

PS400 400K/640K with integral mains power supply **£104(b)**

5.25" Dual Drives 40/80 switchable:

TD800 800K/1280K **£170(a)**

PD800 800K/1280K with integral mains power supply **£190(a)**

PD800P 800K/1280K with integral mainspower supply and monitor stand **£209(a)**

3.5" 80T DS Drives:

TS351 single 400K/640K **£67(b)**

PS351 single 400K/640K with integral mains power supply **£85(b)**

TD352 Dual 800K/1280K **£126(b)**

PD352 Dual 800K/1280K with integral mains power supply **£149(b)**

Combo Drives (5.25" & 3.5" drives)

PD853 with integral psu **£165(a)**

PD853P with integral psu **£179(a)**

DISC DRIVE MULTIPLEXER

see page 5 of this ad for details

For Master, B, B+ and any DFS/ADFS

TDM2 Two computers/one drive unit **£65(b)**

TDM4 Four computers/one drive unit **£115(b)**

TECHNOMATIC WINCHESTERS

Technomatic offer the most popular range of Winchester drives for BBC micro systems at competitive prices. The drives are fully compatible with Acorn ADFS system. Fan cooled switch mode power supply ensure efficient and reliable operation. Combination of floppy and winchester drives in our elegant plinth housing provides an ideal solution for need to have large storage and ease of transferring data to floppies.

Technomatic front end utility for the Master supplied with the winchesters at no extra cost provides an easy and efficient file management system. The entire contents of the drive are displayed on the screen on boot up, each file or directory appearing as an icon. The icon type indicates whether directory or file and type of data if latter.

Larger capacity drives available on request.

P20HD TECHNOMATIC 20 Mbyte Winchester Drive **£429(a)**

P30HD 30Mb Winchester Drive **£449(a)**

P40HD TECHNOMATIC 40 Mbyte Winchester Drive with Acorn ADFS ROM **£749(a)**

P204HP TECHNOMATIC 20 Mbyte Winchester and a 80T DS floppy Drive built in a monitor stand. Includes ADFS Rom. **£609(a)**

P2041HT As P204HP but also with a 10 Mbyte tape streamer backup unit and backup utilities. Includes ADFS Rom. **£1179(a)**

TS10 10 Mbyte Tape Streamer Backup unit with utilities. **£599(a)**

TFC10 10 Mbyte Pre-formatted Cartridge for use with P2041HT and TS10. **£19(d)**

Technomatic Winchesters can be adapted to operate with the SJ Research FileServer by internal modification. However this must be specified at the time of ordering otherwise the drive has to be returned to us for modification.

Adaptor for SJ FileServer **£28**

WINCHESTER Drive Multiplexer

These units let you share a Winchester drive between a number of computers. Full details on request.

TWM2 for two computers. **£99 (b)**

TWM4 for four Computers. **£149 (b)**

NEW **Following the great success enjoyed by our P20HD unit, we are pleased to announce the launch of P30HD – a 30Mbyte hard drive. This drive is also supplied with the free front end utility for the Master.** **£449(a)**

BULK DISCS

50 5.25" 40 T single sided discs with sleeves in lockable box. **£25(b)**

50 5.25" 80 T double sided discs with sleeves in lockable box. **£32(b)**

50 3.5" 80T double sided discs with sleeves in lockable box. **£60(b)**

FLOPPICLENE DRIVE HEAD CLEANING KIT

5.25" Kit with 20 disposable discs **£14.00(d)**

3.5" Kit with 20 disposable discs **£14.75(d)**

DISC STORAGE BOXES

DB340 Lockable 40 × 3.5" **£8.50(c)**

DB550 Lockable 50 × 5.25" **£6.50(c)**

DB570 Lockable 70 × 5.25" **£8.50(c)**

DB5100 Lockable 100 × 5.25" **£10.50(c)**

3M FLOPPY DISCS

5.25" Discs in packs of 10

744 40T SS DD **£8.00(d)**

745 40T DS DD **£9.75(d)**

746 80T SS DD **£12.00(d)**

747 80T DS DD **£12.75(d)**

3.5" Discs in packs of 10

80T SS DD **£13.50(d)**

80T DS DD **£15.00(d)**

(Add £1 for library case packing)

***FREE* Leatherbound Personal Organiser**
with every 50 3M discs

All prices ex VAT and subject to change without notice.

TECHNOMATIC

305 Edgware Road, London W2 Tel: 01-723 0233

PRINTERS

EPSON FX800	£309(a)	EPSON FX1000	£419(a)
EPSON EX800	£395(a)	EPSON EX1000	£539(a)
EPSON LQ1050	£529(a)		
EPSON GQ3500 Laser Printer	£1290(a)		
TAXAN KP815	£249(a)	TAXAN KP915	£350(a)
NATIONAL PANASONIC KXP1081	£149(a)		
NATIONAL PANASONIC KXP1082*	£175(a)		
STAR LC10	£185(a)		
STAR LC10 Colour	£249(a)		
INTEGREX Multicolour Inkjet printer	£519(a)		
BROTHER HR20	£349(a)		
NAT PANASONIC KX P3131 includes massive buffer of 38K	£249(a)		
JUKI 6100 Daisy wheel printer	£295(a)		
BBC/Master Parallel Lead (1.2m)	£5(d)		
BBC/Master Parallel Lead (2m)	£7(d)		
Compact Parallel Printer Lead (1.2m)	£9(d)		
Archimedes Parallel Printer Lead (2m)	£9(d)		

** Price includes Free Master printer lead and WYSIWYG + ROM*

EPSON LX800

Epson's latest budget printer offers a host of new features all utilising Epson's unrivalled knowhow of printer technology and reliability.

★ 180 cps draft/25cps NLQ ★ two modern fonts as std: Sans Serif and ROMAN. NLQ font selection from front panel ★ Tractor and friction feed ★ Single sheet guide with auto load switch. Original + 2 copies.
★ 3K input buffer with character downloading facility
★ Fully compatible with BBC & IBM graphics
★ Centronics interface as standard
★ Price including BBC master lead **£179(a)**

EPSON LQ500

Epson's budget 24pin letter quality printer provides unrivalled print quality with two built in letter quality fonts and widest repertoire of type styles at low cost. Sans Serif and Roman or draft font can be selected from the front panel. Maximum resolution of 360 × 180 dpi. Friction and tractor as standard. Parallel interface. Designed for low noise operation 55dB(A).
Introductory price incl. master lead **£329(a)**

EPSON LQ850

Epson's latest 24pin letter quality printer has been specifically designed for optimum paper handling convenience. Both single sheets and fanfold paper can be loaded simultaneously and a single lever enables the selection of either for printing. Micro adjust feature enables paper feed forward or reverse in increments as fine as 1/180" – ideal for form setting. Auto load of selected paper to printing position. Very fast printing speeds 264cps draft & 88cps LQ. Sans Serif & Roman LQ fonts can be selected from front panel as can the character pitch.
LQ850 has been specially insulated to keep the noise level down to 55db(A). Parallel & Serial interface as std.
Introductory Price including BBC Master lead **£419(a)**

MODEMS

MIRACLE WS4000 V21/23	£135(b)
MIRACLE WS3000 V21/23	£244(b)
MIRACLE WS3000 V22	£409(b)
MIRACLE WS3000 V22 bis	£537(b)
(All modems are BABT approved)	
BBC Data Cable for WS3000/4000	£10(d)
MIRACLE WS2000V21/23 & BELL stds	£92(c)

PLOTTERS

Hitachi 672XD A3 4 Colour HPGL	£499(a)
Plotmate A4S	£420(a)
Plotmate A3M	£640(a)
Roland 880 A3 Flat bed 8 col	£599(a)

Variety of Plotter pens and accessories in stock.
Larger Plotters available. Please enquire.

PRINTER SHARERS & BUFFERS

TSB256 Printer Sharer Buffer

Provides a massive buffer size of 256K and connects three computers to one printer. Autoswitching between computers. Facility to print copies. **£189(b)**

BUFFALO PB Buffer

Parallel buffer for internal fitting to most Epson printers. Simple to instal.
PB128 (128K) **£89(c)**

PERIPHERAL & COMPUTER SHARERS

High quality switches to allow the user to switch between computers, printers, modems etc. Fully shielded metal cases, all lines fully switched.

	Parallel		Serial
2 Computers to 1 Printer 36v36-2	£25(c)	25v25-2	£25(c)
3 Computers to 1 Printer 36v36-3	£39(c)	25v25-3	£39(c)
4 Computers to 1 Printer 36v36-4	£45(c)	25v25-4	£45(c)
2 Computers 2 Printers X-over 36v37-x	£49(c)	25v25-x	£49(c)
BBC Cable Set 3 to 1 (1m ea)	£24(c)		
BBC Cable Set 4 to 1 (1m ea)	£30(c)		

BBC Computer Sharer: TCS26

1 computer to 2 printers fitted with BBC cable **£21(c)**

Paper & Labels

Plain fanfold paper with microperforation:

2000 sheets 9½ × 11"	£12 (£3.50)
2000 sheets 14½ × 11"	£18.50 (£4.50)
1500 sheets A4 90gsm	£18.00 (£4.00)

Labels/1000

Single Row 3½ × 1⅞	£5(d)
Triple Row 2⅞ × 1⅞	£5(d)

PRINTER STAND

A new style printer stand with easy paper feed and paper seperation, provides complete access to paper. Can be used with both top and bottom paper feed. Very space efficient. **£26 (b)**

PROGRAMMING ACCESSORIES/SOFTWARE

Compatible with B, B+ and Master

EpromRyter (Epromer II) EpromRyter is compatible with BBC Master only. See page 7.	£89(b)
EPROMER II	£89(b)
META ASSEMBLER	£145(b)
PORTAL EPROM EMULATOR 512K	£245(b)
TEAM Disassembler	£145(b)
EPROM ERASERS	
UV1B 6 eproms, safety cutout	£47(b)
UV1T 6 eproms, timer, safety cutout	£59(b)

MONITORS

All Monitors supplied with a suitable lead.

12", 14" and 20" MONITORS

Microvitec 1431
Std Res, 14" **£179(a)**

Microvitec 1431AP
Std Res + PAL/Aud, 14" **£199(a)**

Microvitec 1451
Med Res, 14" **£225(a)**

Microvitec 1451AP
Med Res + PAL/Aud, 14" **£255(a)**

Microvitec 1441
Hi Res, 14" **£359(a)**

Philips 8833 14" RGB
Med Res, 14", high contract screen, TTL/Linear Input, Mono/Colour Switch Sound Input. Separate controls for brilliance and contrast. This is the monitor used by Acorn with Archimedes and Compact Computers. **£239(a)**

Sanyo CRT 70
14" High Resolution Monitor **£209(a)**
Resolution better than Microvitec 1441, suitable for Master

Microvitec 2030CS
20" Standard Resolution RGB/ Comp Video **£380(a)**

Microvitec 2040CS
20" High Resolution RGB/Comp Video **£675(a)**

TAXAN SUPER VISION 620
12" Hi Res/Hi Contrast Option to switch to green/amber BBC/IBM Compatible **£269(a)**

TAXAN SUPER VISION 625
12" Super Hi Res and contrast RGB Monitor with option to switch to mono BBC/IBM compatible. **£319(a)**

TAXAN 770+
MultiSysnc Autoscan 14", ideal for utilising the hi res modes on Archimedes. Our price includes a tilt & swivel stand **£499(a)**

NEC MultiSync II 14"
Enhanced version of the original NEC MultiSync. complete with tilt & swivel base. Suitable for Archimedes and PC compatibles. **£489(a)**

12" MONOCHROME MONITORS

PHILIPS BM 7502
Hi Res green screen **£69(a)**

PHILIPS BM 7522
Hi Res amber screen **£75(a)**

Tilt & Swivel Stand for Philips Mono **£6(c)**

TIME WARP

Real Time Clock, Plugs into the user port, battery back up as standard, includes manual, demo software including a diary/planner application program **£29(d)**

MONITOR ACCESSORIES

Microvitec Swivel Base (14" plastic monitors)	£17(c)
Monitor Stand Models B & B+	£10(c)
Monitor Stand Master	£13(c)
Double Tier Stand Models B, B+ or Master	£24(b)
Taxan RGB Lead	£7(d)
Microvitec Lead	£4(d)
Monochrome BNC/Phono Lead	£4(d)

TECHNOMATIC

17 Burnley Road, London NW10 1ED Tel: 01-208 1177

CAD/DRAWING PACKAGES

NOVACAD
Cad Package for B, B & MASTER.
(See page 5 for specification)

Tracker Ball/Mouse Version (TM)	£49 (d)
TM Version plus Tracker Ball	£94 (d)
TM Version plus Mouse	£79 (d)
Plotter Driver Generator	£15 (d)
MOUSE AMX MOUSE with SUPER ART (pse specify B, B+ or Master)	£59 (d)
STOP PRESS (Pagemaker)	£32 (d)
EXTRA/EXTRA (utility for the Pagemaker)	£19 (d)
MAX	£17 (d)
STAND ALONE MOUSE	£34 (c)
RB2 TRACKER BALL RB2 Tracker Ball with Icon Master (for B, B+ & Master)	£59 (c)
RB2 Tracker Ball with Cursor Control Rom (for Master only)	£59 (c)
RB2 Tracker Ball 'Stand Alone' for use with NOVACAD & other software)	£47 (c)
Cursor Control Rom for Master	£12.50 (d)
MIRRORSOFT FLEET STREET EDITOR	£35 (d)

CP/M SOFTWARE

Please send for details on our range of CP/M software for Acorn/Torch Z80 2nd Processors

BBC SOFT/FIRMWARE

DATABASE MANAGEMENT SYSTEMS

VIEWSTORE	£37 (d)
STARdataBASE	£39 (d)
MASTERFILE II	£17 (d)
ACORN OVERVIEW PACKAGE Special Offer (RRP £86)	£69 (b)

WORD PROCESSORS

ACORN VIEW PROFESSIONAL (BBC)	£69 (c)
VIEW 2.1	£35 (d)
VIEW 3.0	£45 (c)
VIEW INDEX	£12 (d)
VIEW PRINTER DRIVER GENERATOR	£8 (d)
VIEWSPELL	£29 (d)
DOT PRINT PLUS	£28 (d)
WORDWISE	£24 (d)
WORDWISE PLUS	£38 (d)
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Interfacing Proj for BBC	£6.95
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WYSIWYG PLUS

WYSIWYG PLUS is a printer and screen utility for Wordwise Plus, View, Interword, and Basic users, supplied on a 16K Eprom. To obtain a particular printer effect, such as enlarged text, it used to be necessary to discover the appropriate 'printer control code' from your manual and incorporate it into your text. Secondly, you had to print several trial copies in order to position the effect correctly in relation to the rest of your text.

WYSIWYG PLUS simplifies this trial and error approach using easily remembered *commands. For example, *ENLARGED not only selects enlarged text on your printer, but uniquely shows you double width characters on your screen, even from within Wordwise Plus!

WYSIWYG PLUS incorporates a logo editor. Just draw your design on screen using the arrow keys, and save the results. Use the *GRAPHICS command to incorporate your design anywhere in your text; position and see your design in your text before faithfully reproducing a hard copy.

There is also special help for daisy wheel users. The *WHEEL command will prompt you to change daisy wheels whenever a change in type style is about to occur.

WYSIWYG PLUS is designed to work with the following systems:

BBC Model B, BBC Model B+, 6502 Second Processor, Turbo coprocessor, BBC Master 128, BBC Compact, All printers (Except lasers)

WYSIWYG PLUS workspace is relocatable.

MAYA TERMINAL EMULATOR

A comms package for the professional user. MAYA emulates DEC VT52, VT100 and Tandberg TDV2215. Special BBC VDU mode allows full access to the BBC VDU driver.

Menu driven software allows the setting up of parameters and function key definitions which can be saved to disc for future use.

Flexible command parser provides a uniform user interface and allows full access to * commands and HELP facilities.

Xmodem and Kermit file transfer protocols are included as standard. Unique feature of MAYA is that Kermit can also be used in 'remote mode', which allows file transfers to be initiated by other computers connected to the BBC. File transfers can also be done with a 'dumb' ASCII protocol. Open architecture allows for expansion and addition of new features. Options currently under development are graphics drivers for Tektronix 4010/4014 emulation, TDGR driver for TDV2215 and a Viewdata patch (provisional version included in the current issue). Registered users will be provided with regular updates and customisation service will also be available to those interested.

The package comprises of a rom, utils disc and a comprehensive manual. It is compatible with Master, Models B & B+. It supports DFS, ADFS, NFS and ANFS filing systems.

BLACK QUEEN

A contract bridge program from BBC Publications both for beginners and for club players. Features include rebid and/or reply of any deal just played. Deals can be saved to a disc. Unique feature of Black Queen is its ability to construct deals from standard or classic ones in newspapers etc.

Compatible with Master, B and B+ **£13(d)**

EDUCATIONAL/FUN SOFTWARE BUNDLE

Wordmover, Wordplay, Pantry Antics, Drawstick, Locomotion

These programs are supplied from the BBC Publications Educational Software range and will be supplied on a 5.25" disc for BBC Master, B+ and B and on a 3.5" disc for the Compact.

5.25" Disc £17.50(d)
3.5" Disc £18.50(d)
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Do you have finger trouble when typing?
Do your letters look like this?

Dear Sor,
I wuold like to...

then you need:

VU-type, a complete touch typing program produced by BBC/Pitman.

It allows you to learn at your own pace and has a wide range of exercises. Screen displays show the keys you have pressed and it will report on your speed and accuracy.

Supplied on a 40T Disc with a manual.

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BISMARCK

An enthralling game of strategy involving the famous German battleship of the same name.

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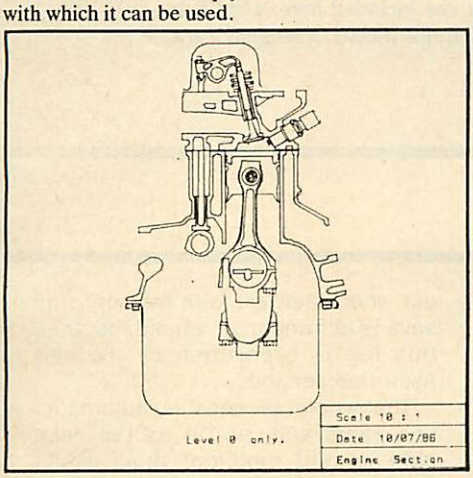
A sophisticated CAD package with unique facilities. Thousands of Novacad packages are being used in widely differing fields ranging from industries for producing engineering drawings to accountants offices for producing flow charts. Architects, engineers, plumbers, kitchen planners and many other professions requiring easy to use facilities for producing high quality output are making extensive use of Novacad's unique features. Novacad is proving to be an invaluable teaching aid in technical schools simply because of the ease with which it can be used.



Novacad is compatible with all models fitted with Acorn DFS. Hardware requirements can be minimum; single drive and FX80 compatible printer are enough to get started, though its performance is enhanced considerably by use of 6502 2nd processor, dual drive and to a degree with B+ and Master's shadow ram.

The major features offered are:

- ★ Simple and easy to use with logical command sequence.
- ★ A large drawing area (approx 15 screens)
- ★ Unique ability to create complex icons made up of upto 500 lines instead of the usual 15 to 20 pixels, store them in a library and recall them at different scales and orientations.
- ★ Zoom facility.
- ★ Create multi level drawings.
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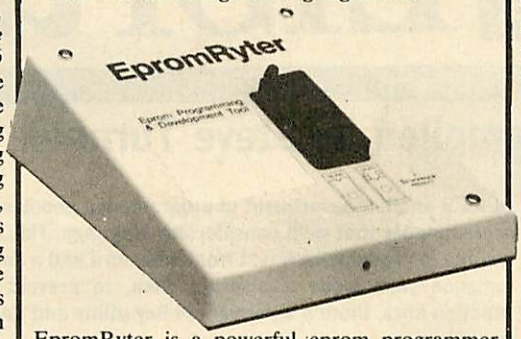
- ★ Grid scaling and locking, displacement measurements.
- ★ Printer routine for FX80/100 compatible printers
- ★ Cursor control from keyboard/tracker ball/ mouse.

Plotter driver generator available as an optional utility, configures a routine for any BBC coompatible plotter. Pre configured routines for popular plotters like Epson HI80, Hitachi, Plotmate are included. Drawings can be scaled to maximumm plotter size.

NOVACAD T/M Version	**£49(d)**
NOVACAD T/M + Plotter DG	**£61(c)**
Plotter Driver Generator	**£15(d)**

EpromRyter

***Highly sophisticated & Advanced Programmer**
***All current single rail eproms handled**
***State of the Art Programming Algorithms**



EpromRyter is a powerful eprom programmer designed for use with the BBC Master Computer. It takes full advantage of the latest developments in the eprom technology and the extra facilities on the Master to provide fast, simple and efficient programming and editing facilities.

The software is totally menu driven and on screen help messages make the programming simple for both specialists and novices alike.

The EPROMRYTER interfaces with the Master through 1MHz bus. It is mains powered with its own psu. 3M Textool zif socket has been fitted to ensure consistent and reliable service over long periods.

The single rail eproms handled by the EpromRyter are:
● 2716 2732 2764 27128 27256 27512 27513 27011 2516 2532 2564 (NMOS & CMOS)
● One time eproms P27XXX, 87CXXX etc.
● Also A suffix eproms such as 27XXXA

£89(b) + VAT

META Ver III ASSEMBLER

"All the good features you would expect to find in a good source code editor are present ... Meta assembler lives in a different world. It is structured to work with any new processor ... as new instruction sets can be added ... as needed ... has a well featured editor with colour highlighting, a sound modular approach." Acorn User October 1986

- Assembles for over 30 popular processors, including Z80, 6800/01/02/04/05/09/11 etc – and 68000 – using native mnemonics for each processor, eg LD A, (HL) for Z80 and MOV A0, $1000 for 68000 etc.
- Fully integrated Editor: four field, all search, search/replace, block copy, delete, move, marked save, load etc.
- Compatible with Portal Eprom Emulators and Team Disassembler.
- Send object code in Intel Hex, S-Record, straight binary etc. down to discs, RS232, parallel port, Eprom Emulators etc – all **during Assembly.**
- Over 50 directives included as standard: handling nestable macros, conditional assembly and twenty types of table definition directives.
- 32 bit labels; 31 character names. Arithmetic and Boolean arithmetic to 32 bits.
- Modular source code with numeric and string parameter passing.
- Serial communicator area with eight options lines: echo, control code trap, LF suppression/ addition etc.
- Over 500 in use throughout the world in universities and many different industries.
- Two 16K Roms, two 80 track discs, A4 ring-bound manual, function-key strip.

£145(b)

EPROMER II

A proven Eprom programmer for BBC Model B and B+ with thousands in use in industry, educational and R&D establishments. It offers many of the powerful features of the EpromRyter and can program all single rail eproms upto 27256. Full details on request. **£89(b)**

PORTAL EPROM EMULATORS

- Emulates 2716, 2732, 2764, 27128, 27256, 27512 eproms at 150ns Access time.
- Load at 4Kbytes/second – No "erase" time.
- 28 pin header plugs into Eprom socket on target system – status monitored on 13 Leds.
- Fully software controlled from Meta Assembler.
- 100 times faster than standard EPROM program/erase cycle.
- Fully CMOS compatible; draws no power from target system.
- Four portals may be independently programmed off same user-port cable.
- Complete with all cables, manual and disc.

PORTAL 512 (2716, 2732, 2764, 27128, 27256, 27512). **£245(b)**

TEAM DISASSEMBLER

The third part of the Universal Development System: a Meta labelling disassembler.

Supports 1802, 8080, 8085, #HD64180, Z80, 65XX (includes 65 col, 6511 etc), 68XX (includes 00, 01, 02, 03, 08 etc):

- Up to 64K of object code translated back into META compatible source code modules: labels automatically inserted on all jump targets, memory references etc.
- Pre-editing stage allows marking of object code areas as byte, string, word, long word etc, tables. These areas disassembled into appropriate directives instead of garbage mnemonics.
- Reconstituted source code ready for immediate re-assembly by META.
- Omniversal search/repalce for re-naming arbitrary label names with meaningful ones.

£145(b)

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PROGRAM Library No. 16

Compiled by Steve Turnbull

HERE'S another assortment of programming goodies. Do keep the programs rolling in, remember that we'll consider any language. This month there's a machine code routine to produce Ascii text from Interword and a double height scrolling routine to enhance your Mode 2 displays. Also, to prevent Control+Break erasing your function keys, there's a permanent key utility and finally an elegant way to produce anagrams.

If you've written any software that you'd like to see included here, send it to Library, The Micro User, Database Publications, Europa House, Adlington Park, Adlington, Macclesfield, Cheshire SK10 4NP.

Title: Ascii from Inter-Word
Language: 6502
Author: Nigel Garvey

The one major disadvantage of the Inter-Word word processor is its inability to produce pure Ascii text – files which contain nothing but alphanumeric characters plus Return. A standard Inter-Word file contains many different control codes and Ascii values over 128.

Enter and run the program and then save the machine code routine as instructed. Then just by typing:

```
*ASCII
```

from the main Inter-Word menu an Ascii version of the file will be saved.

This operation is carried out by marking the whole text, calling the Save marked text option, then intercepting the *osfile* vector to find out where the text is in memory. The save is allowed to go ahead, but then this file is overwritten by the new Ascii-fied version.

The whole process is automatic, very rapid and, as far as I've been able to tell, foolproof. It is useful when writing Basic programs within Inter-Word or preparing text for sending over a comms link.

```
10 REM * ASCII from Inter-Word *
20 filev=&212:oldfv=&90
30 pb_ad=&92:txt_ad=&94
40 handle=&96:endcode=&97
50 osbyte=&FFF4
60 osfind=&FFCE:osbput=&FFD4
70 FOR L%=0 TO 2 STEP 2
80 P%=&C00:[OPT L%
90  LDA filev+1:BPL mark_text
100  STA oldfv+1:LDA filev:STA oldfv
110  LDA #incept MOD &100:STA filev
120  LDA #incept DIV &100:STA filev+1
130 .mark_text
140  LDY #13:JSR k_press
150  LDY #27:JSR k_press
160  LDY #24:JSR k_press
170  LDY #27:JSR k_press
180  LDY #ASC"3"
190 .k_press
200  LDX #0:LDA #&8A:JMP osbyte
210 .to_osfile JMP (oldfv)
220 .incept CMP #0:BNE to_osfile
230  STX pb_ad:STY pb_ad+1:LDY #&A
240  LDA (pb_ad),Y:STA txt_ad:INY
250  LDA (pb_ad),Y:STA txt_ad+1
260  LDY pb_ad+1:LDA #0:JSR to_osfile
270  LDA oldfv:STA filev
280  LDA oldfv+1:STA filev+1
290  LDY #0:LDA (pb_ad),Y:TAX
300  INY:LDA (pb_ad),Y:TAY
310  LDA #&80:JSR osfind:STA handle
320 .read_byte LDY #0
330  LDA (txt_ad),Y:AND #&7F
340  CMP #32:BCS save_byte
350  CMP #13:BNE embedded
360 .save_byte
370  LDY handle:JSR osbput
380 .next_byte
390  INC txt_ad:BNE read_byte
400  INC txt_ad+1:BPL read_byte
410 .embedded
420  CMP #26:BCS omit_block
430  CMP #22:BEQ marked_end
440  CMP #5:BEQ h87_endcode
450  CMP #3:BCS next_byte
460 .h87_endcode LDA #&87
470 .omit_block ORA #1:STA endcode
480 .skip INC txt_ad:BNE check_code
490  INC txt_ad+1
500 .check_code LDA (txt_ad),Y
510  CMP endcode:BNE skip
520  BEQ next_byte
530 .marked_end
540  LDY handle:LDA #13:JSR osbput
550  LDA #0:JSR osfind
560  LDY #27:JSR k_press
570  LDY #18:JSR k_press
580  LDY #27:JMP k_press
590 ]:NEXT
600 PRINT"To save code:"" *SAVE ASCII
C00 ";~P%
```

Get it right!

```
 10 =    0 0 | 210 = 88DA 1 | 410 = AA3B 0
 20 = F6E4 4 | 220 = DAAA D | 420 = B4AB A
 30 = D61F E | 230 = 5D49 F | 430 = 13A7 E
 40 = 2293 B | 240 = 18E0 C | 440 = 595A E
 50 = 7966 4 | 250 =  D3A 8 | 450 = F1E6 A
 60 = F09C C | 260 = 28C6 0 | 460 = 842A 0
 70 = AAB9 2 | 270 =  28E 9 | 470 = 84DD 8
 80 = C6BB 7 | 280 = D911 0 | 480 = 11CA E
 90 = 125E C | 290 = 2936 7 | 490 = B9E3 9
100 = 12C3 2 | 300 = 9452 E | 500 = 8E24 B
110 = 5469 B | 310 = EF1D D | 510 =  116 6
120 = 33D9 C | 320 =    3 9 | 520 = 9388 4
130 = 238B E | 330 = F7C2 D | 530 = B73F A
140 = 77F2 F | 340 = 9DB8 0 | 540 =  325 B
150 = FFFC 0 | 350 =  B53 3 | 550 = 146E 8
160 = 3059 0 | 360 =  F26 1 | 560 = FFFC E
170 = FFFC 7 | 370 = 269F 3 | 570 = B30D 8
180 = 2AB3 1 | 380 = 602A F | 580 = 94F9 A
190 = 7925 1 | 390 = 5E42 6 | 590 = DA42 4
200 =  D2F 4 | 400 = E379 B | 600 = 3399 7
```

Title: Permanent function keys
Language: 6502
Author: Steven Flintham

One of the problems with using the function keys on the BBC Micro is the fact that when Control+Break is pressed you lose the definitions and have to reload them.

This short routine makes a copy of page &B00 – where the function key data is held – in page &A00 and whenever Break is pressed it copies this data back.

The simple upshot of this is that you cannot get rid of the function key definitions without switching off the machine.

If you need to set up a new set of keys, *FX18 will clear the current ones. You can then define a new set and enter:

```
CALL&900
```

This produces a copy of the new set so the old set won't be re-instated on the next Break. Because this program accesses the function keys directly it won't work on the Master or Compact, where the data is held in private ram space.

```
 10 REM * Permanent Function Keys *
 20 MODE 7
 30 FOR L%=0 TO 2 STEP 2
 40 P%=&900:[OPT L%
 50 .entry JSR set_up
 60 .break
 70  LDA #247:LDX #76:JSR j_osb
 80  LDA #248:LDX #break MOD256
 90  JSR j_osb
100  LDA #249:LDX #break DIV256
110  JSR j_osb:LDX #0
120 .bloop LDA &A00,X:STA &B00,X
130  INX:BNE bloop:RTS
140 .j_osb LDY #0:JMP &FFF4
150 .set_up LDX #0
160 .sloop LDA &B00,X:STA &A00,X
170  INX:BNE sloop:RTS
180 ]:NEXT:CALL entry
190 PRINT"To save type:"
200 PRINT" *SAVE <name> 900 B00"
210 PRINT"To re_load type:"
220 PRINT" *RUN <name>"
```

Get it right!

```
10 =    0 0   80 = DF25 C  150 = DC6B A
20 = 1092 2   90 = 543F 1  160 = 97AA 4
30 = AAB9 C  100 = 22AF E  170 = 265E 3
40 = 7F14 4  110 = 8158 B  180 = 5C3B A
50 =  263 B  120 = C212 8  190 = C6C7 E
60 = D2A4 8  130 = 9E83 F  200 = 51F9 6
70 = 5D3D 6  140 = 4CBE 0  210 = 4E14 3
                           220 = A13A D
```

Title: Elegant anagrams
Language: Basic (any)
Author: Hans van Maanen

Further to the Anagram program by Ian Fell in the March 1988 issue of *The Micro User*, here is a much more elegant and transparent way to produce the permutations of a string.

The method is not original and has been translated from Pascal. It takes the current string, exchanges the Kth and Nth letters and then produces the permutations for the rest of the string.

Luckily, because BBC Basic always produces a local copy of a string once the process is completed for one set of permutations, just exiting the routine restores the previous permutation.

The whole procedure is recursive – it calls itself and, as such, results in a very short program. There is a limit of 10 characters – a limit generated by Basic itself because of the nested FOR . . . NEXT loops.

The program could be altered to use a GOTO for infinite stacking, but since the time taken to produce all the permutations of a 10 character word is rather long, it's not really worth worrying about. This limit doesn't apply to the Archimedes, which works fast enough to make a long run worthwhile.

```
 10 REM * Elegant Anagram *
 20 DIM B%256:C%=B%-1
 30 REPEAT
 40 INPUT"Your word",W$
 50 PROCperm(W$,1,LENW$)
 60 UNTIL FALSE
 70 END
 80 DEF PROCperm($B%,K%,N%)
 90 IF K%=N% PRINT $B%:ENDPROC
100 LOCAL I%
110 FOR I%=K% TO N%
120 PROCexch(K%,I%)
130 PROCperm($B%,K%+1,N%)
140 NEXT
150 ENDPROC
160 DEF PROCexch(R%,S%)
170 LOCAL Z%
180 Z%=C%?R%
190 C%?R%=C%?S%
200 C%?S%=Z%
210 ENDPROC
```

Get it right!

```
10 =    0 0   80 = BC4A 2  150 = ED0F 6
20 = 43AB B   90 =  6D8 F  160 = 78B4 5
30 = BFBA D  100 = A914 4  170 = FF34 4
40 = 53DC E  110 = 6196 C  180 = ADB9 B
50 = 320F 3  120 = 5481 3  190 = 2B56 9
60 = 226C F  130 = 21BD B  200 = A1D7 A
70 = FD2E F  140 = 2C83 D  210 = ED0F 6
```

Turn to Page 101 ▶

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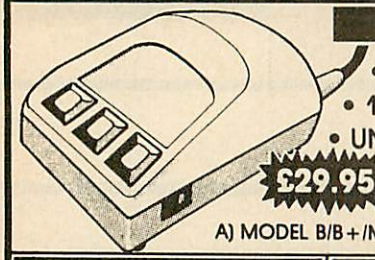

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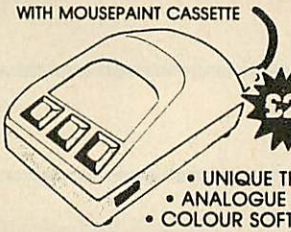

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PROGRAM Library

◀ From Page 99

Title: Smooth scroller
Language: 6502
Author: Paul Carpenter

We have had a number of message scrolling routines in the Library but this one provides a double-height Mode 2 display with a number of special features.

If you type in the program as it stands you can see the way the routine continuously feeds text in from the right and off to the left. A couple of special character codes allow you to pause the display – \ – or to flash it twice – ! .

The amount of text you can have in the message is limited to about .75k, but a simple modification would allow you to be able to scroll any message at will.

The program is a little bit naughty since it directly accesses the screen, but when we get down to this level something has to go – although there are many improvements that could be made such as specifying where on the screen the scrolling message appears.

The program will work on most machines but not in shadow screen mode on the B+, Master, Compact or with any third party shadow screen on the B.

```
  10 REM * Smooth Scroller *
  20 FOR L%=0 TO 2 STEP 2
  30 P%=&900:[OPT L%
  40 .scroll
  50  LDA #19:JSR &FFF4:LDY #0
  60  LDA (&72),Y:CMP #ASC("\")
  70  BNE noflash:JMP flash
  80 .noflash CMP #ASC("!")
  90  BNE return:JMP halt
 100 .return LDA #&80:STA &70:LDA
#&7D
 110  STA &71:LDX #0:LDY #8
 120 .lp LDA (&70),Y:STA (&70,X)
 130  INC &70:BNE lp:INC &71:LDA &71
 140  BPL lp:LDA #&7B:STA &71
 150 .lp1 LDA (&70),Y:STA (&70,X)
 160  INC &70:BNE ski2:INC &71
 170 .ski2 LDA &70:BPL lp1:LDA &71
 180  CMP #&7D:BNE lp1:LDY #0
 190  LDA (&72),Y:STA dat:LDA #&A
 200  LDX #dat MOD256:LDY #dat
DIV256
 210  JSR &FFF1:LDX #0
 220 .loop LDA data,X:LDY &74:BEQ
left
 230  DEY:BEQ lmid:DEY:BEQ rmid
 240  AND #&2:JMP none
 250 .lmid AND #&30:JMP four
 260 .rmid AND #&C:JMP two
 270 .left AND #&C0
 280 .six LSR A:LSR A
 290 .four LSR A:LSR A
 300 .two LSR A:LSR A
 310 .none STA data,X:INX:CPX #8
 320  BNE loop:INC &74:LDA &74:CMP
#4
 330  BNE skp3:LDA #0:STA &74
 340  INC &72:BNE skp2:INC &73
 350 .skp2 LDA (&72),Y:BNE skp3
 360  LDA #mess MOD256:STA &72
 370  LDA #mess DIV256:STA &73
 380 .skp3 LDA dat-
a:STA&7D78:STA&7D79
 390  LDA data+1:STA &7D7A:STA &7D7B
 400  LDA data+2:STA &7D7C:STA &7D7D
 410  LDA data+3:STA &7D7E:STA &7D7F
 420  LDA data+4:STA &7FF8:STA &7FF9
 430  LDA data+5:STA &7FFA:STA &7FFB
 440  LDA data+6:STA &7FFC:STA &7FFD
 450  LDA data+7:STA &7FFE:STA &7FFF
 460  RTS
 470 .dat NOP
 480 .data OPT FNd(0):OPT FNd(0)
 490 .halt DEC &75:LDA &75
 500  CMP #200:BEQ noXtra:RTS
 510 .noXtra LDA #&FF:STA &75
 520  INC &72:BNE jumpover:INC &73
 530 .jumpover JMP return
 540 .flash DEC &75:LDA &75:CMP #128
 550  BEQ noXtra:AND #32:BEQ see
 560  LDA #6:STA &FE00:LDA #30
 570  STA &FE01:RTS
 580 .see LDA #6:STA &FE00
 590  LDA #32:STA &FE01:RTS
 600 .mess:]:NEXT
 610 REPEAT READ A$:A$=A$+" "
 620 $P%=A$:P%=P%+LENA$
 630 UNTIL A$=" ":P%!-2=0
 640 !&72=mess:?&74=0:?&75=255
 650 MODE 2:REPEAT
 660 CALL scroll:UNTIL FALSE
 670 DEFFNb(B%):?P%=B%:P%=P%+1:=L%
 680 DEFFNw(W%):!P%=W%:P%=P%+2:=L%
 690 DEFFNd(D%):!P%=D%:P%=P%+4:=L%
 710 DATA ** SUPER SCROLLER **\
 720 DATA Scrolling message boards
are
 730 DATA always a good addition to
 740 DATA any program.! This super
 750 DATA utility can scroll nice
big
 760 DATA letters in mode 2. It's
 770 DATA really easy to use.! Just
 780 DATA put your message in these
 790 DATA lines, more can be added
or
 800 DATA some could be deleted and
 810 DATA that's all there is to it
 820 DATA folks!! To make the
current
 830 DATA display flash just use a
 840 DATA backslash and to produce a
 850 DATA pause use the double
line.!!
 860 DATA ... If these characters
 870 DATA don't suit you then change
 880 DATA them in lines 60 and 80
...
 890 DATA The whole message repeats
 900 DATA automatically. Like this:!
 910 DATA ""
```

Get it right!

```
 10 =     0 0 | 310 = 1E4F 3 | 610 = D18E E
 20 = AAB9 9 | 320 =  875 5 | 620 = 5212 5
 30 = 7F14 2 | 330 = 5A04 5 | 630 = 2AD1 C
 40 = DB26 A | 340 = 6790 8 | 640 =  F86 C
 50 = D6DE 8 | 350 = 4BC7 8 | 650 = 1E9C 8
 60 = B1FA 7 | 360 = 65DD 9 | 660 = FCA1 4
 70 = BB79 5 | 370 = 7316 8 | 670 =  D4A 9
 80 = 2ED0 1 | 380 = DFB9 D | 680 = 7C5C 6
 90 = 3A63 0 | 390 = 3443 6 | 690 = E8F5 3
100 = 51F5 C | 400 = 9A0D 7 | 710 =  FEB 3
110 =  C7C 2 | 410 = 9E4D 2 | 720 = BFD2 D
120 = 8AB4 1 | 420 = D0AC C | 730 = 9200 C
130 = F0F8 D | 430 =  BF3 D | 740 = BE79 F
140 = 5FB5 A | 440 = A5BD 6 | 750 = 7CEC 9
150 = 7B35 2 | 450 = A1FD D | 760 =  E74 9
160 =  609 F | 460 = 9843 2 | 770 = C1BB 0
170 = 9BA0 7 | 470 = 6F78 2 | 780 = C238 1
180 = 24E4 A | 480 = BDC6 5 | 790 = 4295 8
190 = B563 8 | 490 = 1F4C 8 | 800 = 1887 9
200 = 6894 9 | 500 = D0D9 4 | 810 = 2644 D
210 = F942 3 | 510 = DAC8 8 | 820 = 730B 4
220 = EDB5 8 | 520 = 7F33 E | 830 = F0A7 3
230 = 1B18 2 | 530 = AC9B F | 840 = A687 0
240 = 52B2 3 | 540 = B005 9 | 850 =  61C 4
250 = C041 9 | 550 = 85F4 A | 860 = 6A8B 8
260 = 8C34 D | 560 = 2F18 F | 870 = 21A6 9
270 = B3A1 8 | 570 = BB82 D | 880 = A98C 3
280 = 2869 1 | 580 = 3408 2 | 890 = 1781 B
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```

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AFTER many months of eager anticipation – especially by Music 5000 owners – Hybrid Technology's Music 2000 Midi Interface finally made its official debut at The Micro User Show. It expands the range and number of sounds available to the Hybrid Music System (reviewed in our September 1987 issue) by allowing it to control external Midi-compatible instruments.

To recap, the system consists of a Music 5000 synthesiser and a Music 4000 keyboard controlled by Ample – a powerful music production language. Music 5000 can play eight different music voices simultaneously. Music can be entered on the stave using traditional notation or in the Notepad editor using Ample's own programming language.

With Music 4000 you can play the sounds in real time from the keyboard and record music into the system either in real time or step time – one note at a time.

Together they form a powerful, flexible and extremely versatile system, but not without limitations. First, you are restricted to the sounds Music 5000 is capable of producing, and second, you only have eight voices to play with.

Music 2000 brings the power of Ample to the outside world. Via Midi it has access to an unlimited number of sounds, and a musical arrangement can now consist of nine parts each with up to 12 voices. In all 32 Midi voices are available, a four-fold increase on those available with Music 5000.

The hardware consists of a box the same size, shape and colour as Music 5000 with one Midi In and three Midi Out sockets. Three LEDs on the front show when data is being sent to the Out sockets. A connector plugs into the power supply socket under the BBC Micro. There is an extension socket so you can still power a disc drive or teletext adapter, for example. A ribbon cable connector plugs into the Music 5000 extension 1Mhz socket and again it has an extension socket should you want to daisychain other equipment.

The controlling software is another module – M2 – which is installed on booting the system disc. It adds several new words to the language, and it is quite easy to construct and modify pieces to send music lines to a Midi instrument. This is done using a *mix* word, and a ready-made mix definition is supplied on disc for you to *EXEC into any program.

The MIDIV word is used to send a music part to a Midi instrument. MIDILINE selects the output line – one of the three Midi Out sockets – and MIDICHANNEL sets the channel number (1 to 16) it is to be transmitted on. For example:

```
3 SHARE 8 VOICES MIDIV
1 MIDILINE 6 MIDICHANNEL
```

will assign eight voices to part 3 and transmit it on Midi channel 6 through Midi line socket 1.

You can arrange a piece to play some parts on the Music 5000 and other parts on a Midi instrument. The Music 5000 voices remain independent of Midi voices, which do not appear on the mixing desk and are not affected by its settings. New Midi voices can be selected with MIDIPROGRAM which sends a program change message to a Midi instrument.

MIDIBEND	Set pitch bend
MIDICHANNEL	Set channel
MIDICHPRESSURE	Set channel pressure
MIDICONTROL	Set control
MIDILINE	Set output line
MIDIOUT	Send byte
MIDIPRESSURE	Set pressure
MIDIPROGRAM	Select program
MIDIRT	Assign a real-time control voice
MIDIV	Assign a voice
MIDIWOUT	Send a word

New words used by Music 2000's M2 module

Midi is limited

As you experiment with the system you will realise, if you hadn't already known, that the Midi specification has limitations. For example, it does not cater for slurred notes, so they are ignored. Also it cannot handle two simultaneous notes of the same pitch since this is impossible

Turn to Page 105 ▶

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- **A very powerful Midi controller**
- **Integrates into the Hybrid System**
- **Lets you control external equipment**

Against

- **Draws power from the BBC Micro**
- **Manual could be better**
- **You can't use a Midi keyboard**

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◀ From Page 103

to play on a keyboard. This is not the case on a guitar which is one reason why Midi guitar controllers are difficult to produce successfully.

Ample, of course, can handle such things and the manual explains how to navigate your way around these problems should they occur. It must be emphasised that the fault lies with Midi, not the Music 2000.

As well as transmitting musical parts via Midi with MIDIV, the system lets you assign a real time control voice with MIDIRT. This sends clock, start and stop messages which will make sequencers and drum machines follow an Ample performance. They will respond to tempo changes, so a drum machine can perform rallentandos and accelerandos, something most machines cannot normally handle by themselves.

A drum machine is started by issuing a hit – X – and stopped by issuing a rest – ↑ . Another X will make it continue playing from the point at which it stopped. It is a simple matter to start and stop a drum machine or sequencer from a PLAY string by defining sections containing a hit or a rest. A start word would simply be:

```
"part9s"[ X ]
```

As the system is under real time control you can program a fermata – a musical pause – which will pause a drum machine. This would be very difficult to do using traditional sequencing techniques. When using the MIDIRT command I experienced a few timing problems. This could have been a software bug or I may have had a faulty unit. Hybrid is looking into it and if the fault lies in software it will soon be fixed.

You need at least one Midi instrument to use Music 2000. Expander modules are ideally suited to computer control and there are many on the market from which to choose. They contain the gubbins of a synthesiser but without a physical keyboard, which keeps the cost down. With Music 4000, however, you can play an expander – or any other Midi instrument – directly from the keyboard.

Unlimited potential

These are the basic features of the system. The real power over Midi, however, becomes apparent when you consider the programming side of Ample. Let's just run through a few possibilities. A slightly trivial example is the ability to define a word to send the same pitch to all instruments for tuning purposes.

You could define a word which would switch local control on or off. Likewise, a simple definition could send an Omni Off and Mono On message or send a Midi reset command – although not many instruments respond to this one. You can define a word holding the exact location of a particular sound. For example:

```
"casiozap[ MIDIV 2 MIDILINE 11
 MIDIPROGRAM
```

In this way you can create a library of the sounds on your Midi equipment which you can call by name – far friendlier than punching bank and patch buttons. When using Music 4000, a list of voices can be presented for selection by pressing Shift.

An advanced application would be the construction of panels in the Notepad editor to set synthesiser parameters in the same way as instrument panels are used to alter Music 5000 instruments. The parameters would be scrolled through using the up/down cursor keys. Not all instruments respond to program change numbers in the same way, and the manual defines a word which helps you test an instrument's response to the numbers.

The voices on a drum machine can be played directly from Ample and you could create a set of customised percussion words to trigger features the drum machine's internal sequencer may not be able to access. For example, a drum machine may respond to a wide range of velocity – loudness – messages but you may only be able to program one accent level on the machine itself.

You can use VEL to balance a mix of drums sounds – or any other Midi voices which respond to velocity messages. A word can be defined to apply a pitchbend or glissando to a note. Whenever the effect is required you just insert the

Turn to Page 106 ▶

WHAT IS AMPLE?

Ample – Advanced Music Production Language – is more than just a language. It's a complete system of musical notation. The many attempts this century alone to produce a simpler method of notation have all fallen on deaf ears – players of natural instruments are an extraordinarily conservative lot. So there's little chance that we'll all eventually be reading Ample's textual notation instead of sticks and blobs. But it could well revolutionise the scoring of electronic music.

All the notes are designated by letter name. Upper case indicates a rise in pitch, and lower case a fall, with +, – and = for accidentals. Key signatures can either be ignored or predefined. Notes are octave-independant, though an octave can be set by a number plus a colon (zero for notes centred around middle C).

Duration is fixed in arbitrary time units followed by a comma, with the / symbol extending a note by its defined value. Rests are scored with ↑ . Bar lines are optional, but if included, Ample will check the bar length. That's just the beginning. You can write complex polyphony, adjust tempi and dynamics and in fact score any musical function, normally with little fuss.

◀ *From Page 105*

word after the note in Ample notation. It's even possible to control the music in real-time with a joystick.

MIDIOUT and MIDIWOUT will send a byte and a word (two bytes) over Midi. Using these words, any Midi message can be sent. One extremely useful application is the transmission of system exclusive data. They can also be used, for example, to send song position pointer information to make a drum machine play a particular number of patterns in a certain order.

For the ultimate in control you can assign each voice to a separate Midi line and channel. In this way individual notes, even in a chord, can be played with different sounds, and different volume levels and have different sets of controls applied to them – pitchbend or modulation for example.

As well as note on and off commands, Midi caters for additional performance controls specific to keyboards. The Music 2000 software includes several words specifically to control functions such as pitchbend and channel pressure. The manual is fairly comprehensive and includes lots of word definitions for a variety of practical applications although I do wish more of the advanced facilities had been explained. If you want to explore these features Hybrid's Ample Nucleus Programmer Guide is a must.

The bottom line...

An extremely powerful addition to the Hybrid Music System in particular, and to the world of Midi in general – Recommended.

Getting Midi in

The Midi In socket is not mentioned at all in the manual but you can be sure it's there for a purpose – Hybrid changed the original design specifically to include it so they have obviously got something planned for it. However, it has no high level language support and will probably need to be accessed with machine code.

Whereas most transmission functions are readily programmable in Ample, lack of high level support for the Midi In means it won't be so easy to get feedback from a Midi system – for example, to write a Midi monitor to examine the bytes being transmitted by an instrument. Also, although it would be possible to write a voice editor in Ample it would not be so easy to download a voice from a synth into the micro. Perhaps an even bigger gripe will come from people who already have a Midi keyboard, as it cannot be used in place of the Music 4000. Not yet, at least.

Music 2000's Midi implementation chart – the grid covered with Os and Xs which tells you which features the instrument supports – has only one X on it and that's against the official note off message. Music 2000 sends the unofficial note off message – a universally accepted practice implemented on virtually all Midi instruments.

For the sake of completeness, Hybrid is going to implement the official note off message although, in truth, it is very rarely used. In terms of Midi control there is virtually nothing the Music 2000 cannot do.

If you already have a Hybrid Music System, Music 2000 along with a Midi expander will increase the power of your system enormously. Now you can play a full set of drum sounds – using a drum machine – and still have lots of voices left for the music.

If you've fought shy of the Hybrid Music System because it couldn't interface with Midi equipment now's the time to think again. The power of Ample applied to any Midi-compatible instrument you care to name – what a combination.

Check your Leaky Listing corrections

HERE are the corrections for last month's Leaky Listing, the guessing game that was on Page 116. Remember, there is always more than one way to solve a problem, so provided you've found the errors, you may be right even if you've changed the program in a completely different way to us.

The greater than and less than signs in lines 70 and 80 are the wrong way round. As it stands, the game will prompt TOO SMALL for numbers that are too big and vice versa.

The loop that counts the number of guesses – *I%* in lines 40, 100 and 130 – counts one more than it should so you get one less go. So line 40 should read:

```
I%=0
```

Guess in line 130 should be lower case to match the random number generated in line 30.

In line 60 the colon should be a semi-colon or, even better, a comma as that would also work on Basic I. This also applies to the other INPUT commands.

In line 90 there is a jump out of a loop. This is bad programming practice as, apart from being unstructured, if you do it too often you'll run out of stack memory. Repeat...Until loops can only be nested about 15 deep, and unclosed ones are treated as nested ones within this total.

Finally, the omission. You can see what's wrong if you correct the program and save it. Then, any time you switch your micro off, back on and chain the program you'll find the first number to guess is always the same, and the following ones always follow the same sequence. This is because the random number generator is not seeded and a full explanation of why this is needed is in your User Guide. In our program just insert the line:

```
25 Z=RND(-TIME)
```

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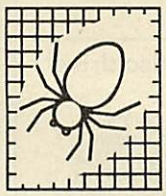

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I/O Podule (with User port, Analogue port & 1MHz bus)	£75
MIDI add-on to I/O Podule	£27
ROM Podule (takes five 8 bit ROMs, of 16, 32, 64 or 128K)	£56
Real time Video Digitiser (Watford)	£249
Sound Sampler (Armadillo)	£105
20 Mb Hard Disc for 300's	£469

Archimedes Printer Lead	£7.00
Archimedes Monitor Lead	£7.50

WORDPROCESSORS

Wordwise +	£18	View	£49
Image Writer	£23	Viewspell	£32
Interword ROM	£35	ViewIndex	£12

DATABASES

AlphaBase	£39	Delta Plus	£57
Viewstore	£49		

SPREADSHEETS

Intersheet ROM	£35	Viewsheet	£49

BUSINESS GRAPHICS

GammaPlot	£30	Interchart ROM	£22

INTEGRATED PACKAGES

Logistix – Database, Spreadsheet, Time Management & Business Graphics £95

PC EMULATION Pack
(for 310, 410 & 440), including MSDOS 3.21 £89

GRAPHICS, ART & DESIGN

Interchart	£25	Gamma Plot	£30
Artisan	£31	Gamma Plus	£60
Zarch	£16	Toolkit (Beebug)	£32
		Toolkit (Clares)	£31

LANGUAGES

ANSI 'C'; ISO-PASCAL; FORTRAN 77;	£95 each
Cambridge LISP; PROLOG X	£181 each
TWIN EDITOR	£27

0% (APR) FINANCE

*For a limited period, Watford Electronics are able to offer the Archimedes range of microcomputers at **0% (APR)** finance. Credit facility available subject to status. Please inquire for further details.*
(Watford Electronics are Licenced Credit Brokers)

CREDIT TERMS now available. Please telephone or write in for further information.

Archimedes to BBC SERIAL LINK

Using this simple data link, it is possible to solve all your BBC to Archimedes data transfer problems. The kit is supplied with a disk, and the necessary cable to connect the two computers. Using this package it is possible to transfer any data from the BBC to Archimedes at upto 19200 baud.
By far the easiest way to transfer data to your new computer.

Only £25

Archimedes 5¼"/3½" Disc drive Interface

With this interface it is possible to connect almost any 5¼"/3½" disc drive with its own power supply to the Archimedes. Upto FOUR drives can be connected and NO SOLDERING is involved. Supplied complete with necessary lead.

Only £19

Note: This is not simply a lead. Attempting to connect an external disc drive by direct connection may result in damage to your Micro.

Watford Electronics are the main Approved Stockist of ACORN SPARES and ECONET Referral Centre

The 80186 Co-Processor

This package consists of the Master 512 board, Watford Co-Pro Adaptor, 1770 Disc Upgrade and Acorn ADFS. This is a complete package, with its own power supply, ready to interface with your BBC Micro. The Master 512 board using the 80186 16 bit Processor at 10MHz and running Digital Research DOS Plus, gives a high degree of IBM compatibility at an extremely reasonable price. Included in the 512k package is a mouse and the amazing Digital Research GEM suite of software; GEM Paint, GEM draw and GEM desktop giving a complete Mouse Icons environment (All other GEM packages will work on the 512k). Famous packages that will work with the 512k board include Wordstar, Dbase II, Lotus 123 and many others. The only requirement to upgrade any BBC Model B to this system is you must have twin 80 track disc drives.

£259

BBC MASTER

BBC MASTER 128K Micro incl. Acorn's: View, Viewsheet, ADFS, BASIC Editor & TERMINAL plus £125 worth of FREE OFFER (see below)

£379

SPECIAL OFFER

FREE . . . £105 worth of Hardware & Software

*Gemini's OFFICE MATE & OFFICE MASTER packages on Disc consisting of: Database, Spreadsheet, Beebplot graphics. Accounts packs: Cashbook, Final Accounts, Mailist, Easyledger, Invoice & Statements, Stock Control and **Watford's** 3½", double sided 1 Megabyte (unformated) single disc drive complete with cables, ready to connect to the micro – with every BBC Master purchased from us this month.*

BBC MASTER with Turbo Board + above SPECIAL OFFER	***£475***
512K Processor Add on Board "inc. Mouse and GEM package"	***£185***
BBC AIV (Domesday) System	***£3999***

ADD-ONs & ACCESSORIES

Turbo 65C102 Add-on Module		£95
Econet Module for the Master		£40
Twin ROM Cartridge for Master		£7.50
Quad ROM Cartridge for Master		£12
Universal Processor Adaptor		£75
Master Reference Manual I	(No VAT)	£14
Master Reference Manual II	(No VAT)	£14
Master Advance Ref. Manual	(No VAT)	£19
64K Upgrade Kit for B+		£32
Acorn 1770 DFS Kit complete		£41
ECONET Upgrade Kit for BBC		£42
ALL ECONET UPGRADES Available		
ARIES' Professional IEEE Interface		£238
Acorn IEEE Interface Complete		£265
Morley Teletext Adaptor with ATS Rom		£99
Filestore E01		£825
Filestore E20		£705

BBC MASTER COMPACT

System 1	Standard Package	£310
System 1A	System 1 + TV Modulator	£322
System 2	System 1 + Green Hires Monitor	£364
System 3	System 1 + Medium Res Colour Monitor	£478
RS232 Kit for BBC Compact		£25
Additional 3½" Drive for BBC Compact		£90

(Securicor carriage £7)

65C102 2nd PROCESSOR

(65C102 replaces the original Acorn 6502 2nd Processor)

This amazing package consists of the Acorn 65C102 'Turbo' Board, the Watford Co-Pro Adaptor and Acorn 1.2 DNFS ROM. The 'Turbo' board, running at 4MHz with 64k of additional RAM will increase the speed by between 50 and 200% depending on the application running, and allow a BASIC program of upto 44k in any screen mode. Simply by plugging in the Co-Pro and the DNFS ROM with its special Tube host code and you massively increase the power of any Model B. This is a complete package, with its own power supply, ready to interface with your BBC Micro.

£135

Z88 Sinclair's Portable Micro

The worlds first, truly portable Micro. It is A4 size, only an inch thick and weighs under 21lbs. Ideal for use when travelling or as a personal organiser.

Only: £239

FREE

With every Z88 purchased from us this month, we are giving away absolutely FREE, a Z88 to BBC Interface Link, 4 rechargeable batteries and a compact Mains Battery Charger worth £38.

ACCESSORIES

Mains Adaptor	£8.65
32K RAM Pack or 32K EPROM Pack	£17.35
128K RAM Pack or 128K EPROM Pack	£43.40
512K RAM Pack	£169
Z88 to BBC or PC Link	£21.70
Z88 EPROM ERASER	£34.75
Serial Printer Cable	£8.65
Parallel Printer Cable	£24.00
Z88 Modem	£86.90
Z88 Soft Carrying Case	£8.50
Sinclair Z88 Computing Book	£9.95
AA Nicad Rechargeable Battery	£1.50
Battery Charger, Compact & Fast (3 Hours)	£6

CO-PRO Adaptor

Now for the first time you can add the Master Co-processor boards, to your standard BBC model B, or B Plus. With this brand new launch from Watford Electronics you can attach any BBC Master co-processor to the original BBC Micro. Once again Watford strides ahead with a new concept in BBC B Micro add-ons. This unique external Co-Pro Adaptor, is protected by patent applications.

Use the super fast Turbo Board with your BBC B, it is much faster than the 6502 2nd processor superseding it.

With the 512K addon your standard BBC machine achieves IBM PC compatibility at a realistic price running GEM, Lotus 123 and many other programs. Included with the 512k package is a high precision mouse and the Digital Research GEM suite of software; GEM Desktop, GEM Write GEM Paint. This requires both the 1770 DFS and the ADFS to be fitted to your computer.

To use other co-processors you require a BBC B with DNFS 1.20 or higher, or BBC B+ fitted with 1770 DFS 2.20 or greater. Co-processors work exactly like a second processor.

Master owners may use Co-Pro to add a second Co-processor externally.

Watford, brings power to your BBC at only:

£35 (carr £5)

SPECIAL OFFER

EPROMs for BBC's Sideways ROMs.

2764-250nS £3.00
27128-250nS (12V5) £3.25
27128-250nS (21V) £4.50

RAMs (Low power) for ATPL, WATFORD, etc., Sideways ROM Boards

6264LP (8K) £4.50
2 × 6264LP (16K) £8.95

NEW

BBC PCB DESIGNER

At last! A PCB design package for the BBC Micro that eclipses some industry CAD software. Hard to believe, isn't it? Just look at some of the impressive package specification:

- Library Component Designer
- Component Library (over 200 parts)
- Component List Editor
- NetList Editor
- PCB Board Designer
- Plotter Driver
- Dot Matrix Printer Driver

This integrated suite of programs is packed full of sophisticated PCB related features making the design of a circuit board a dream instead of a nightmare.

Input for the design may be manual, taking components from the library and connecting them, or highly automatic starting from a netlist and list of components. In auto mode, PCB Designer will never allow you to forget a connection again! And of course, either in manual or auto mode, connectivity is maintained no matter how you later move the parts around and route the tracks. Connections snap together and angles are corrected, Through hole vias and track thickness are established automatically and many more features, far too numerous to mention here, are included in the system.

Some of the PCB Designer's features are:

- Over 120 library pad sizes/shapes
- Four colour adjustable palette
- Zoom range 2:1 to 1:4
- Highlighting of specific tracks
- Normal and surface mounted components
- Rapid screen review
- Menu driven
- Variable gridlock
- Switchable measurement grid
- Pre-select pan/scroll facility
- Large 24" x 24" Board size
- Copy route facility
- Connectivity held at all times
- Ratsnesting of part connections
- Auto-plaement of text references
- Text linked to parts
- Automatic placement of vias
- Printer and plotter outputs provided
- Comprehensive manual

TYPES OF PLOT OUTPUT

Top and bottom track artworks, top and bottom silkscreens, solder resist mask, drilling detail drawing and check plot. All these may be with pad holes on/off, scale of 2:1 or 1:1, board edge on/off, 90 degres rotation, mirror image, width of pen, x & y offsets and batch plots to disc.

The above is only a taste of the superb features of this software, surely capturing previously unknown performance from the BBC Master computer. BBC B owners will need to fit at least one block of sideways RAM, Shadow screen memory and a disc drive. A trackerball or a mouse is also required.

BBC PCB Designer is supplied on a 32K PAL PROM and comes complete with two discs and a comprehensive manual containing examples and useful information on PCB design.

By the way, as a bonus, PCB Designer is also suitable for many other schematic drawing applications such as circuit diagram drawing.

Introductory Offer: £99

(Please write in for further technical details)

Archimedes Real-Time Digitiser

Watfords' Archimedes Video Digitiser is the most sophisticated digitiser ever designed for a micro. It provides a fast and flexible means of capturing images from a video camera or recorder for display and manipulation on the Archimedes range of Micros. Off-air television signals may also be digitised via a video recorder or TV tuner.

Once captured, Video images can be stretched, squahsed, rotated, stored on disk, printed, or used by applications software.

Applications include desktop publishing, graphics, animation, image analysis and recognition, medical imaging, automatic inspection and measurement, databases, interactive video, remote transmission of pictures via a modem, movement detection ... or anything else you can think of!

SPECIFICATION

SOFTWARE

All the driver software for the digitiser is contained in a ROM on the podule. Facilities provided include:

- Grabbing of images to the screen or dumping to memory.
- Continuous grabbing and display for previewing or camera alignment.
- 'Hot key' grabbing – pressing a (configurable) key combination grabs and displays an image on the screen while another program (e.g. paint software such as Artisan) is running.
- Scaling (zoom/shrink) any section of an image to any size in X and Y directions, with optional X/Y flip, window clip and logical (AND/OR/XOR) plotting.
- Rotation and scaling to any angle and size, rotating about any point, with optional window clip, and logical (AND/OR/XOR) plotting.
- Very versatile matrix printer screendump facility for Epson FX, LQ and EX compatible printers – pictures can be printed to ANY size (including multiple sheets) at any orientation, using any available printer density and one of six internal sets of dot patterns, or with user definable patterns (pattern editor supplied). The screen-dump can also be used for general purpose graphics screen printing.
- Pixel value lookup tables: pixel values can be passed through a user defined lookup table to allow contrast enhancement, thresholding pseudo-colouring etc.
- Smoothing and noise spot removal to enhance image quality.
- Creation of sprites from all or part of a digitised image.
- Saving and loading of digitised images in compressed format.
- Combination of pictures by adding, avaraging, subtracting, multiplication etc.
- Much faster versions of the Arthur *ScreenLoad and *ScreenSave commands.

Software facilities are accessed via operating system star (*) commands and SWI calls. High resolution screen modes using MultiSync type monitors are supported.

UTILITY DISK

A disk is included, containing sample pictures, examples and utility programs including the following:

- Colour image grabbing using colour filters with monochrome or colour cameras, including colour balance adjustment and scaling facilities.
- Pattern editor for 2 colour display modes and printer screendumps.
- 512 line interlaced display for non MultiSync monitors.
- Thresholding to create two colour images.
- Capture and replay of animated sequences.
- Several example programs illustrating the use of digitiser software.

RESOLUTION

Images are digitised to 512 (h) x 256 (v) pixels, and then scaled to fit the Archimedes' screen. It is possible to digitise to 512 x 512 pixels if the picture is stationary for about 0.1 second. 512 x 512 images can either be displayed on a MultiSync monitor, or on a normal monitor using interlacing.

Pictures are digitised to 64 levels of grey (6 bits). Note, however, that it is only possible to display all 64 levels on a monochrome monitor, or a colour monitor which has a composite (CVBS) input. For this reason, the Philips CM8533 monitor is recommended instead of the standard Archimedes monitor. It is also possible to connect both a colour and a monochrome monitor at the same time.

Any 2,16 or 256 colour graphics mode can be used to display digitised pictures. In two colour modes, grey levels are represented using dot patterns, which may be redefined if required (a pattern editor is supplied).

SPEED

Video fields are captured in real time (1/50th sec.), and then transferred to Archimedes' memory or the screen. The grab/display rate is dependant on the screen mode and picture size, up to 25 fields per second for quarter screen images, or 12.5 per second for fullscreen (Mode 9).

HARDWARE

The digitiser is a single width podule, with a BNC socket on the rear panel for the video input, which may optionally be terminated via a link. There is 128K of on-board memory to store the digitised image, and a 32K ROM on the podule contains all the driver software.

Automatic video level control and black level clamping circuitry is used to ensure that the optimum contrast is obtained from a variety of video sources. A filter is included to avoid patterning effects when using colour sources.

Price £249

Continued ——→

All Monitors are supplied complete with BBC connecting leads FREE.

MICROVITEC 14"

- 1431 – Standard resolution as used on the BBC television computer programme **£175**
- 1451 – Medium resolution, suitable for word processing in mode 0 **£225**
- 1441 – High res, exceeds the capabilities of the BBC micro **£359**
- 1431AP RGB + PAL and AUDIO **£199**
- 1451AP RGB + PAL and AUDIO **£255**
- **2030 CS 20" Med Res** **£380**
- **2040 CS 20" Hi Res** **£675**
- Dust Cover for Microvitecs **£5.50**
- Touchtec 501 Touch Screen **£239**

TAXAN 12" & 14"

- **TAXAN Super Vision 2 Type 620** Hi-res RGB Colour monitor. Ideal for Wordprocessing **£263**
- **TAXAN Super 3, Type 625** Ultra Hi-res, RGB Colour) Text mode switch allows monochrome text display in Green, Amber, White reverse or White on Blue **£313**
- **TAXAN 14" Multisync 770 Plus** – An autoscanning Ultra high res, colour monitor. Ideal for Archimedes, IBM & Compatibles **£495**

- **NEC JC-1401P3EE 14"** Multisync Ultra Hi-res Intelligent Colour monitor. Auto scans frequencies between 15KHz to 35KHz. Text switch provides 7 colours for Database & wordprocessor. **£489**

PHILLIPS Monochrome 12"

BM7502 Hi-res Green	**£69**
BM7522 Hi-res Amber	**£74**

STAR BUY

- **PHILLIPS 14"** Hi-Res, dark glass, attractively finished Colour Monitor – supplied complete with RGB, SKART and Audio/Phono Inputs. A push-button switch toggles between Hi-Res monochrome green text mode and full colour display.

ONLY £195

ZENITH 12"

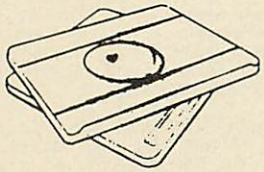
- **Amber (New Design) Hi-resolution** **£72**

N.B. carriage on Monitors **£7** (securicor)

SPARE LEADS

BNC Lead for Zenith or Philips	**£3**
Skart Monitor Lead	**£5**
RGB lead for TAXAN Monitors	**£3**

SWIVEL BASES



for Video Monitors

Our professional type swivel bases have front adjustable control. This alleviates the need to lift the monitor when adjusting the viewing angle.

for 12" Monitors **£8** (carr. £2.50)

for 14" Monitors **£10** (carr. £2.50)

Anti-Glare VDU Screen

These extremely effective, easy to install, 12" & 14" VDU screens eliminate harmful glare, improves contrast on colour monitors. Increases productivity in offices. A must for all wordprocessor users. Hundreds of these screens are in daily use in various branches of one of the leading High Street banks.

£12

Acorn-Olivetti JP101 Ink Jet Printer

JP101 accepts 9½" standard fan fold paper or single A4 sheets. Tractor & Friction feed supplied as standard – print speed 50 cps. £59

Pack of 4 refills **£12**

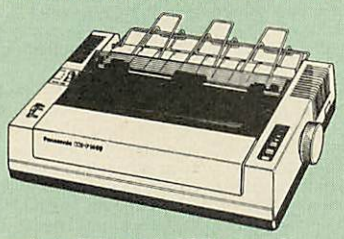
Screen Dump ROM for JP101 £11

TAXAN KP-815 PRINTER

80 column, Bi-directional, 160 CPS, (NLQ 24cps); Friction & tractor feed + paper roll holder as standard; Epson FX compatible.

Offer Price £179

Panasonic KX-P1081



Attractively finished in BBC beige. Bi-directional, logic seeking. Has IBM and Epson RX compatible command calls. Speed: 120CPS draft mode, 24 CPS NLQ mode. Character width range from 5 cpi to 17 cpi. Upto 40 downloadable characters. Functions include, Proportional spacing, Justification, centering and left & right ranging.

(Price inludes, FREE a 4ft Printer Lead, and a Dump Out 3, Screen Dump ROM worth £35 with every printer purchased from us).

Special Price: **£145** (carr. £6)

Optional RS232 Interface: **£39**

Panasonic KX-P1082

This superb printer is very similar to the popular KX-P1081 printer but at 160 cps (40 cps in NLQ), a lot faster.

(Our LOW price also includes £35 worth of FREE BBC Cable and Dump Out 3 ROM).

Introductory Offer: **£172** (carr. £7)

Panasonic KX-P3131 Daisy-Wheel Printer

This low-cost high-performance Daisy Wheel printer is ideal for anyone wishing to produce clear, immaculate letters or reports. It delivers, flawless text at 10, 12 & 15 CPS. Supports proportional spacing. Is Bi-directional. logic seeking. Printing speed: 17CPS. Has 6k printer Buffer. A printer of similar spec could cost a lot more than our ridiculously low price of:

Only **£245** (carr. £7)

Single Sheet Feeder	**£175**
Tractor Feed	**£90**

FREE extra 32K Printer Buffer with every KX-P3131 purchased from us this month.

NEC P2200 PINWRITER

24 pin; 80 column; 168CPS – 56CPS LQ; Epson LQ compatible, 7K Buffer; 7 resident FONTS, Friction & Tractor feed, front load single sheet feed, etc.

Price: £285

Cut Sheet Feeder	**£59**
Additional Font Cartridge	**£27**

VARIOUS PRINTERS & ACCESSORIES

Brother HR15 RS232 Daisy Wheel	**£275**
Brother HR20 Daisy Wheel	**£349**
HR20 Tractor Feed Attachment	**£110**
Epson EX800 Printer	**£395**
Epson EX1000 Printer	**£529**
Epson FX800 Printer	**£295**
Epson FX1000 Printer	**£389**
Star LC10 Printer	**£175**
Star LC10C Colour	**£215**
Epson LQ500 Printer	**£275**
Epson LQ800 Printer	**£399**
Epson LQ850 Printer	**£429**
Epson LQ1050 Printer	**£529**
Epson LQ2500+ Printer	**£749**
Epson LX800 Printer	**£189**
Epson SQ2500 Printer	**£975**
Epson Paper Roll Holder	**£17**
EX800/1000 Colour Option	**£55**
EX800/1000 Colour Ribbon	**£18**
EX800 Cut Sheet Feeder	**£130**
EX1000 Cut Sheet Feeder	£195
FX/LQ/LX800 Single Sheet Feeder	**£135**
FX/LQ1000 Single Sheet Feeder	**£169**
Hi-80 Refills – Set of 4 Pens	**£7**
LX800 Cut Sheet Feeder	**£75**
LQ800 Tractor Feed	**£44**
LQ1000 Tractor Feed	**£50**
LQ2500 Cut Sheet Feeder	**£195**
LX1000 Cut Sheet Feeder	**£305**
Hitachi 672 Colour Plotter	**£475**

(Securicor Carriage on Printers £7

EPSON PRINTER INTERFACES

All these interfaces fit inside the printer.

RS232	**£27**	RS232 + 2K Buffer	**£52**
IEEE 488	**£65**	RS232 + 8K Buffer	**£62**

KAGA/TAXAN PRINTERS

(IBM/Epson compatibles)

Kaga KP915 Printer	**£350** (carr £7)
RS232 Interface	**£49**
RS232 Interface with 2K Buffer	**£69**
RS232 Interface with 16K Buffer	**£89**

INTEGREX COLOUR JET PRINTER

Colour Jet 132 Printer	**£525**
Paper Roll	**£6**
Screen Dump Software	**£10**
Colour Cartridge	**£14**
Black Cartridge	**£8**
100 A4 OHP transparencies	**£55**

PRINTER SHARERS

(Ideal for School environment)

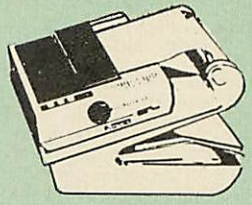
Connects	Serial	Centronics
2 BBC Micros to 1 Printer	£25	£26
3 BBC Micros to 1 Printer	£36	£35
6 BBC Micros to 1 Printer	–	£99

PRINTER CHANGER

3 Printers to 1 Micro (Centronics) **£65**

(Cables extra, specify type required when ordering)

Professional Printer Stand



This new professional printer stand takes hardly more space than your printer. Due to the positioning of the paper feed and re-fold compartments ie. one above the other, the desk space required for your printer functions is effectively halved. Additional facilities include: Easy access to paper from both sides, used with both top and bottom feed paper and with its dial controlled paper feed system with adjustable deflector plates it ensures smooth paper flow and automatic refolding.

£26 (carr. £2.50)

THE EPSON RX-FX-KAGA PRINTER COMMANDS REVEALED

So you bought yourself a new printer, because the salesman in the shop showed you how clever it is and impressed you with all sorts of printouts to show its capabilities – he may even have offered you a special price.

However, now that you have got it home and connected it to your BBC microcomputer, you are wondering how to make it perform these magical tasks. The manual seems to give no clues, and when you type in the example programs, the computer throws the LPRINT statements back in your face.

Now what do you do, when this £400 piece of high technology refuses even to move its head, and you have stayed up until 2 in the morning with copious supplies of coffee, desperately trying to print something out. Once again, Watford Electronics comes to your help with our new book entitled 'THE EPSON FX-KAGA PRINTER COMMANDS REVEALED'.

This book describes in plain, easy to understand English, how to use and make the most of your KP810, PW1080A or any other Epson FX80 compatible Printers like Panasonic KX-P1080/1, etc., with the BBC Micro, both from BASIC and Wordwise.

It describes in detail how to obtain the maximum in graphics capability from your printer and includes full indexes allowing you to cross index the numerous commands. Every command is explained in detail, with an accompanying BBC Basic program and an example of its use from Wordwise.

£5.95 (No VAT)

PRINTER LEADS

Centronics lead to connect BBC micro to EPSON, KAGA, SEIKOSHA, NEC, STAR, JUKI, BROTHER, SHINWA, Panasonic etc. printers.

Standard length (4 feet long)	£6
Extra long (6 feet long)	£8
Compact's Special Centronics Lead	£9
RS232 Cable	P.O.A.
IBM Parallel 1 metre Cable	£7
Double ended 36 way Centronics Lead	£9

PRINTER RIBBONS & VARIOUS DUST COVERS

Type	Ribbons	Dust Covers
BBC Micro	–	£3.50
BBC Master	–	£4.00
Archimedes Micro pair	–	£9.00
Brother HR15/20	£3.00	£5.00
EX/LQ800	£7.50	£4.50
EX/LQ1000	£8.00	£5.00
RX/FX80/85/800/MX80	£4.00	£4.95
RX/FX100/1000	£6.00	–
Kaga/Texan KP810/815	£5.25	£4.00
LQ2500	£9.00	£5.50
LX80/86	£4.00	£4.50
LX800	£4.00	£4.75
M1009/GLP	£4.00	£3.75
Panasonic KX1080/81	£4.50	£4.75
SQ2500	£25.00	£5.50
Star NL10	£4.00	£4.50
Microvitec Metal	–	£5.50

Our attractive Dust Covers are manufactured from translucent PVC. The seams are stitched and edges are taped to prevent splitting due to continuous use.

Listing Paper (Perforated)

- 1,000 Sheets 9½" × 11" Fanfold Paper £7
- 2,000 Sheets 9½" × 11" Fanfold Paper £12
- 1000 Sheets 9½" x 11" NCR 2 Part Fanfold £19
- 1,000 Sheets 15" × 11" Fanfold Paper £9
- 1000 Sheets true A4 Fanfold Paper £11
- 2000 Sheets true A4 Fanfold Paper £20
- Teleprinter Roll (Econo paper) £4

(All our Fanfold paper is Micro perforated leaving a smooth clean edge when the tractor feed strips are detached).

Carriage 1K Sheets £2.50. 2K Sheets £3.00

PRINTER LABELS

(On continuous fanfold backing sheet)

1,000 90 × 36mm (Single Row)	£5.00
1,000 90 × 36mm (Twin Row)	£4.90
1,000 90 × 49mm (Twin Row)	£7.50
1,000 102 × 36mm (Twin Row)	£6.25

Carriage on 1,000 Labels £1.00

MEGABUFFER 256

This new Megabuffer 256 from Watford is a full featured 256K Printer Buffer. It allows the computer to print 256,000 character in a short time thus freeing the computer very quickly. In short it makes light work of printing large documents, screen dumps, etc. It is extremely simple to connect. The features are:

- Low Cost, High performance.
- Improves efficiency by making more efficient use of computer and printer.
- Compatible with any computer and printer that uses Centronics Parallel connections including all BBCs, IBM PCs, etc.
- Total compatibility with all software.
- Cheaper phone bills when using your Modems.
- Ideal for those doing large graphics screen dumps that are slow to print.
- Multi-Copy facility allows you to print several copies via Megabuffer without going through your computer.
- Data Dump facility is included.
- Built in test unit for both the buffer & your printer.

In conclusion it can safely be said that MEGABUFFER 256 is the ultimate printer Buffer for both the amateur and professional user.

Only £125 (carr £2)

OFFICE MASTER

CASHBOOK – A complete "Stand Alone" accounting software package for the cash based sole trader/partnership business. It is designed to replace your existing cashbook system and will provide you with a computerised system complete to trail balance.

FINAL ACCOUNTS – Will take data prepared by the Cashbook module and produce a complete set of accounts as following: Trial Balance with inbuilt rounding routine; Notes to the accounts; VAT Summary; Profit & Loss A/C; Balance Sheet.

MAILIST – A very versatile program. Enables you to keep records of names and addresses and then print, examine, sort and find them, all with special selection techniques.

EASILEDGER – A management aid software tool designed to run alongside an existing accounting system. Essentially a Debit/Credit ledger system which can handle sales, purchase and nominal ledger routines to provide instant management information.

INVOICES & STATEMENTS – Greatly reduces the time and cost of preparing Invoices and Statements by storing essential information like customer names, addresses and account numbers. Has VAT routines and footer messages facility.

STOCK CONTROL – Allows you to enter stock received, stock out, summary of stock items and current holdings together with details of total cost, total stock to minimum level, units in stock ordering, quantity and supplier detail.

All this for only **£21** (Disc)

OFFICE MATE

- DATABASE
- BEEBCALC SPREADSHEET
- BEEBPLOT GRAPHICS

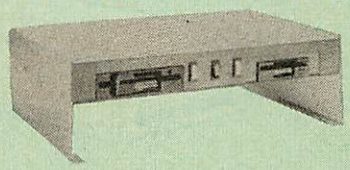
DATABASE – Set up a computerised card index system with powerful search facilities.

SPREADSHEET – Offers many calculation and editing features.

BEEBPLOT – Provides visual representation from Spreadsheet data.

OFFICE MATE Only £10 (Disc)

New Launch Offers
Disc Drives DP35-800S



A Double disc drive – with a difference! Times are changing fast for the floppy disk, and whilst the current standard for the BBC B and Master Series is the 5.25 inch disk, the standard for the future will most certainly be the smaller; faster and more reliable 3.5 inch disks – now a standard feature of both the Master Compact and the Archimedes Series.

To support the present disc drive users, and cope with the future, we have designed our own plinth-mounted disk system – called the DP35 800S, it contains both the 5.25 inch and the 3.5 inch drive formats as well as offer a firm and rigid support for a monitor on top. With the BBC Micro underneath, the plinth makes a surprisingly small footprint on the desk – leaving you more space to work with.

The 5.25" disc drive is 40/80 track switchable. For ease of access, the switches are front mounted. The unit has its own power supply, independent of the BBC Micro.

Watford's new plinth enables users to read, write and format disks both in DFS and ADFS format – currently the accepted standard for the Master Compact and the Archimedes, it also enables the user to read disks written for the Archimedes. Ideal for both BBC & Master.

Launch Offer: **£165** (carr. £7)

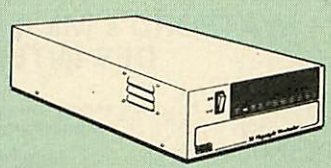
OKIMATE COLOUR PRINTER

The first ribbon transfer printer in its price range which offers fully versatile colour or black printing. A 24 element print head produces more than 100 shades with exceptional clarity. Ideal for use with Quest Paint or AMX Super Art.

Only: **£139**

BBC Screen Dump	£10
Colour Ribbon	£6
Black Ribbon	£6

30 Megabyte Winchester Drive



Undoubtedly the best value for money Winchester Hard disc available anywhere for the BBC Micro.

This 30 Megabyte hard disc is completely compatible with the Acorn ADFS – that's why we have bundled it with each Winchester drive, along with a full user guide and full utilities including file copy, 1000K save routines, Format and Verify – in fact all you need and more.

Finished in rugged metal and fetching BBC beige, the Winchester has an internal fan, so quiet you won't even hear it! A switched mode power supply and a neon-lit on/off switch are there along with a light on the hard disc to tell you when it is working – just compare the price with our competitors' 20 or 28 Mbyte discs!

Compatible with the Master, and the BBC B (with 17"X disc interface).

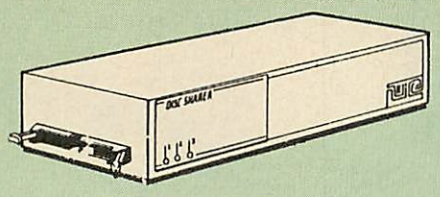
Launch Offer **£425** (Carr. £12)

Panasonic KX-P1083

Fast 240CPS (48CPS NLQ);
8K Buffer, Epson compatible, etc.
Launch Offer: £299

NEW

DISC DRIVE SHARER



(Ideal for educational establishments)

At last, a low cost alternative to the Econet system. Watford's Intelligent Disc Drive Sharer allows you to connect 3 BBC micros (model B, B+ and Master series) to a single or double disc drive. Running under any DFS or DDFS, this intelligent unit will automatically queue the computers. Each computer has a status light dedicated to it. If it is green you will get immediate access to the disk, and red means that you are next in line. The unit plugs directly into the disc drive socket on each computer and is powered by the mains. (N.B. Not for use with ADFS.)

Launch Price: **£59** Price includes 3 Cables

NOW WITH EXTRA FEATURES AT NO EXTRA COST – Watford's latest DFS 1.44

- Incorporates Acorn's Official Tube Host Code so that those with 2nd processors no longer need to waste a ROM socket on the DNFS.
- Option to DOUBLE the speed of BPUT and BGET.

If you already have the Watford Electronics DFS and wish to incorporate these new facilities then simply return your existing DFS ROM to us together with £5 remittance for an upgrade. Please pack the ROM securely and address the package to our Upgrades Dept.

WATFORD's & ACORN's SINGLE DENSITY DFS

Watford's popular and widely acclaimed DFS has now been available for five years and has gained a large following amongst serious and educational users of the BBC Micro. Owners of Acorn or any other standard DFS can upgrade to our "Ultimate" DFS merely by replacing their DFS ROM. See below for this upgrade. ***(P.S. Watford's highly sophisticated DFS is fully compatible with Acorn DFS). (not Acorn's 1770 DFS)***

- *Complete Disc Interface Kit including DFS ROM and fitting instructions* **£78**
- *Acorn's 0.90 DFS Kit complete* **£79**
- *DFS Manual (Comprehensive)* *(no VAT)* **£6.95**

(P.S. Our DFS manual is the only comprehensive Manual available for the BBC micro and covers both Acorn & Watford DFSs).

- *Watford's sophisticated DFS ROM only* **£16**
- *We will exchange your existing DFS ROM for Watford's Ultimate DFS ROM for only* **£12**
- *DNFS ROM only* **£17**
- *ADFS ROM only* **£25**

NEW

WATFORD's Mk II Double Density DFS INTERFACE

Many of our customers have wanted to use our superior DDFS and Acorn ADFS together. Now our MkII DDFS board has been adapted to allow the use of Acorn ADFS as well.

Added features include:

- Acorn ADFS compatible – Use ADFS on our DDFS board.
- Tube host Code – No longer any need to have the DNFS in your machine to use Co-Processors, even the CoPro and Master 512.
- Auto 40-80 Track sensing – no need to fuss with 40/80 track switches (even works with protected disks).
- An extremely powerful 8271 emulation – ensuring compatibility with almost all software.
- New low profile – small footprint board.
- Fits with all third party ROM boards.
- Option to double the speed of file handling operations – BPUT and BGET.
- Operates in both single and double density modes.
- OSGBPB has been recoded, increasing still further the speed of file handling.

Please note that not all DDFS's are capable of providing either the full 80% storage increase or of allowing a file the full size of the disk – Ours allows both of these!

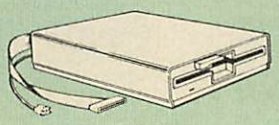
If you already have a DDFS (any manufacturer), and wish to upgrade to our MkII version, then simply return your existing ROM and DDFS board and we will supply the new DDFS for only **£30.00.**

- Special introductory offer **£39.00**
- DDFS Manual (No VAT) **£6.95**
- We will exchange your existing DFS Kit for our sophisticated DDFS for only **£25.00**

Please note, as the MkII DDFS is a hardware and software upgrade, it is not possible for existing Watford DDFS users to simply exchange their ROM for the new version.

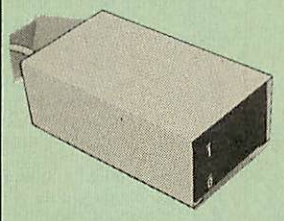
SPECIAL DISC DRIVE/DDFS OFFER

CLS400S



- The popular Mitsubishi 400k Single Disc Drive, Double Sided, cased with Cables. Plugs directly to your Micro.
- Watford's popular DDFS Disc Interface (allows 720k storage). Will run in both Single and Double Density modes 40/80 track Software switchable.
- A comprehensive User Friendly Manual.

A Bargain at Only **£130** (£6 carr)
(Offer valid while stocks last)



3½" DISC DRIVE OFFER

These top quality 3½" Double sided, 80 track, 1 Megabyte (unformatted each Disc Drives), are attractively finished in BBC beige. They are supplied complete with all cables and a Utilities Disc. They run directly from the BBC B/Master's own PSU.

- Single 400K Drive **£69**
- Twin 800K Drives **£126**

Mysteries of Disc Drives & DFS Revealed

Are you tired of faulty cassettes, and lengthy loading times? Do you want to upgrade your BBC micro to take discs but you get tied up in the plethora of jargon surrounding the choice and use of these systems.

Then The Mysteries of Disc Drives and DFS Revealed is the book for you. It explains in detail the different types of systems available, how they are installed and how to use them. Many examples are given including pre-written programs to call various functions of the DFS available only through Operating System calls. Different types of disc, 40/80 tracks etc. are all explained. This book is ideal for the beginner confused by the plethora of choice available in the marketplace.

£5.95 (Book No VAT)

DISC ALBUMS

Attractively finished in antique brown leather look vinyl. Stores upto 20 Discs. Each disc can be seen through the clear view pocket.

£4

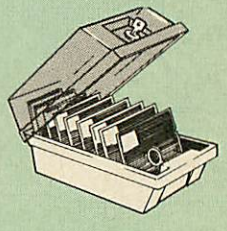
FLOPPY HEAD CLEANER KIT

The heads in floppy drives are precision made and very sensitive to dirt. The use of a cleaner Kit is a sensible precaution against losing valuable data. It is recommended to clean the drive head once a week. It is very simple to use. Available in 3½" & 5¼", please specify.

£6

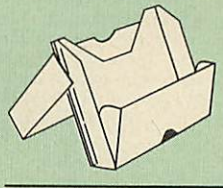
ANTISTATIC LOCKABLE DISC STORAGE UNITS

Gives double protection – Strong plastic case that affords real protection to your discs. Antistatic helps avoid data corruption whilst in storage. The smoked top locks down. Dividers and adhesive title strips are supplied for efficient filing of discs.



- **M35** - holds upto 50 5¼" discs **£6.00**
- **M85** – holds upto 95 5¼" discs **£8.00**
- **M25*** – holds upto 25 3 ½" Discs **£5.50**
- **M50** – holds 50 3½" Discs **£7.50**

* Not lockable



PLASTIC LIBRARY CASES

Holds up to 10 5¼" Discs. **Only £2.00**

DISC PLONKER RACK

When using ones micro, there is a tendancy to have more than one Disc on the desk. This exposes them to the hazards of fingerprints, scratches, dust, coffee and an untidy desk.

Why not protect your valuable data from all these hazards with the help of our extremely handy and low cost DISC PLONKER RACK. It holds up to eight 5¼" Discs.

Protection at Only: **£2**

DUST COVERS (For our Disc Drives)

Single CLS (without PSU) **£3.20** Twin CLD (without PSU) **£3.85**
Single CS (with PSU) **£3.95** Twin CD (with PSU) **£3.90**

Quality Disc Drives from Watford

To help you decide which drive is the most suitable for your needs (and your pocket!), we have produced the table below.

The first capacity given in the first column indicates capacity in single density mode. That within the brackets is the capacity in double density mode. All disc drive type numbers start with the prefix "C".

The tinting on some of the boxes is used to indicate which Drives are 40 track (non-tinted) and which are 80 track (tinted). All our 80 track drives are already fitted with a 40-80 select switch.

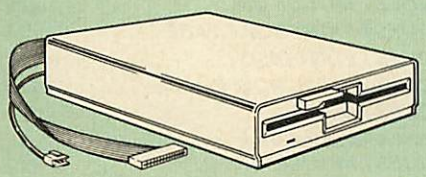
***All our Disc Drives are Double Sided and will operate in both Single and Double Density modes.** Extensive experience of the usage of disc drives suggests that the JAPANESE drives currently represent about the best in terms of speed, reliability and overall "elegance" available for the BBC Micro.*

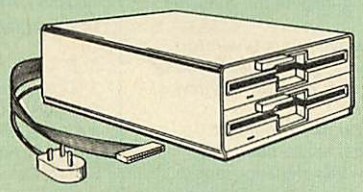
Various other "manufacturers" of disc drives for the BBC micro (more accurately, "packages" label other manufacturers drives with their own name). We buy the high quality JVC and Mitsubishi drives in large quantities directly from the manufacturers, package them and sell them at "dealer" prices direct to the public.

If you look around the popular BBC micro press, you will find that the prices we quote for the top quality, new slimline disc drives are, virtually without exception, some of the best around. These prices, coupled with the backup of one of the country's largest distributors of BBC peripherals provides a superb deal.

Unless you anticipate using dual drives in a fully expanded BBC system for long periods of time with little ventilation, then we suggest that our range of "CL" disc drives without the PSU (Power Supply Unit) would be quite adequate (extensive tests within our workshops have confirmed this). All drives are supplied complete with a SPECIAL UTILITIES Disc, Cables and Plugs. The Drives with power supply have a mains moulded plug for safety purposes. Ideal for Schools & Colleges. We are now able to supply all single disc drives with Power Supply, in either single or dual case. (Dual case has a twin data cable and a power supply capable of driving two disc drives) allows easy expansion to a dual drive unit, at a later date. Prices stated in the pricing boxes below are for single drives in standard single cases. Single drives in a dual case cost an extra £5. (At Watford we anticipate your needs of tomorrow, not just today)!

When using a BBC Micro, most people find themselves short of desk space. The Watford's BBC Micro plinths form an ideal way of recovering some of this precious space) your BBC, Disc Drive and Monitor can all occupy the same vertical footprint and still be comfortably situated. With the Watford Double plinth, your Disc Drive is mounted vertically at one side, leaving a very valuable area directly in front of you for such useful items as spare discs, pen, paper, reference manuals, etc. Follow the trend with Watford plinth. (Turn to the 6th page of our advert for the Plinths).
P.S. All our 5¼" Disc Drives with PSU are compatible with the Compact Micro. All you require is the special Compact Disc Drive Cables designed by us.





Capacity	Drives without P.S.U.		Drives with P.S.U.	
	Single	Twin	Single	Twin
200K (360K)	CLS 200 £89		CS 200 £98	
400K (720K)	CLS400S £85	CLD 400 £168	CS 400S £96	CD400 £188
800K (1.44M)		CLD 800S £167		CD 800S £186

● TWIN Disc Drive Case, complete with Power Supply & Cables **£43**
Securicor carriage on Disc Drives £5 to £6

Prefix ***C*** *= Cased Drive*
L *= Less PSU*
S *= Single*
D *= Double*

Suffix ***S*** *= 40-80 Switchable*

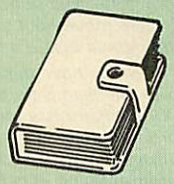
e.g. CLS400S = Cased Disc Drive, Less power supply unit, single 5¼" 400K, (720K in double density); Double sided; 40/80 track switchable.

Cable to connect 5¼" Disc Drives to BBC Compact
Single £9 Twin £12
Special Cable to connect both 3½" and 5¼" Disc Drives
simultaneously to the BBC Compact £13

3M – DISKETTES

3M – SCOTCH Diskettes with Lifetime warranty from Watford Electronics your 3M Appointed Distributor.

- *10 × 5¼" S/S D/D 40 Track Diskettes (744)* **£8.00**
- *10 × 5¼" D/S D/D 40 Track Diskettes (745)* **£9.75**
- *10 × 5¼" S/S D/D 80 Track Diskettes (746)* **£12.50**
- *10 × 5¼" D/S D/D 80 Track Diskettes (747)* **£12.75**
- *10 × 5¼" 1.6M D/S D/D High Density Discs for IBM XT and AT* **£28**
- *10 × 3½" S/S D/D 40/80 track Discs* **£13.50**
- *10 × 3½" D/S D/D 40/80 track Discs* **£15**
- *10 × 3½ High Density Diskettes* **£43**



FREE

This extremely useful and attractive Personal Leather Organiser worth upto £50 is yours when you buy from us, 5 Boxes of any of the 3M range of Discs that we advertise above.

TOP QUALITY 3½" & 5¼" DISKETTES

To complement the range of quality discs and disc drives that WE already sell, WE are now supplying some special offer packs of 10 high quality discs. Each Disc has a reinforced hub ring and carries a lifetime guarantee. These are supplied complete with selfstick labels and packaged in an attractive plastic library disc box. We strongly recommend these Discs.

- *10 × **M3** 3½" D/S D/D 80 Track Discs* **£13**
- *10 × **M4** 5¼" S/S D/D 40 Track Discs* **£6.50**
- *10 × **M5** 5¼" D/S D/D 40 Track Discs* **£8**
- *10 × **M7** 5¼" D/S D/D 80 Track Discs* **£9**
- *3" Double Sided Discs* **£3 each**

Special BULK OFFER on 5¼" DISCS

PRICES SLASHED

(Supplied packed in Anti-Static Lockable Storage Units)
(Lifetime warranty on Discs)

BULK PACK DISCS in lots of 100

Type	S-S 40T	D-S 40T	D-S 80T
● Without Sleeves	£35	£39	£45
● With Sleeves	£38	£42	£48

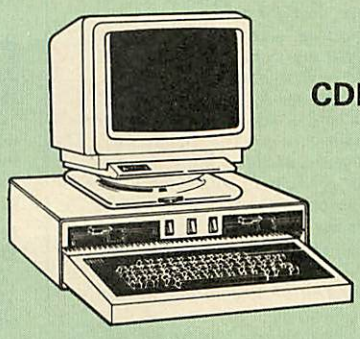
PRICES SLASHED

WATFORD's WINCHESTER DRIVES

- 10 Megabyte Unit with ADFS **£375**
- 30 Megabyte Unit with ADFS **£425**

(30 Meg Unit is supplied complete with utilities software. For full details see Page 4 of our advert)

CDP800S **CDPM800S**



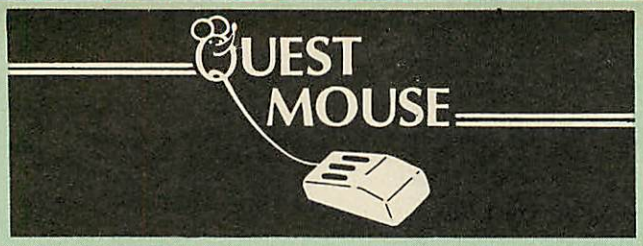
Twin 800K Double sided 40-80 track switchable disc drives mounted in an attractively finished Beige colour plinth for the BBC Micro. Supplied complete with integral power supply, cables and Utilities disc. The mains switch with neon On/Off light indicator, and the two 40/80 track switches are mounted on the front panel for ease of use.

CDP 800S for BBC Micro £192
CDPM 800S for Master £196
DP35-800 for BBC/Master £165
(For DP35-800S spec. see Page 4 of our advert)

(Securicor Carr. £7)
(The above drive units are 2 Megabytes unformatted)

Continued

NOMINATED FOR MICRO BRITISH COMPUTING AWARDS 1987



QUEST MOUSE

The ultimate in Mouse technology, the Watford Electronics Quest Mouse must be the most powerful Mouse package yet produced for the BBC Micro. Featuring state of the art 32K ROM software the Quest Mouse package is filled with features essential to the budding artist. The Quest Mouse is a high precision, low profile and large footprint mouse. It has three large comfortable buttons and its RUBBER COATED STEEL BALL is smooth and easy to use on virtually any work surface. This also eliminates any directional bias that one encounters on the most well-known mouse for the BBC. The Quest Mouse is FULLY HARDWARE COMPATIBLE with the AMX MOUSE so that it will work with any of the AMX range of software.

The two parts of the Quest package are available separately so that existing Mouse owners can upgrade to the Watford's sophisticated Quest Paint software or replace their existing worn out mice for a minimum cost.

QUEST PAINT

The Quest Mouse software is supplied on a PALPROM unit to allow the sophisticated 32K program to be used from a single ROM socket. It is compatible with the BBC B, BBC B Plus and BBC Master Series machines.

The software is used to draw high resolution Mode 1 pictures in full colour. All menu selection and control of the drawing process is performed with the mouse so that you will hardly ever touch the keyboard.

SOFTWARE FEATURES

The software is far too powerful for us to describe it fully in such a small space. Below is a list of the various features. Please write to us for a fully descriptive leaflet.

Disk interface not required. Utilities disk has facility to create and print big screens. Colours applied can be solid, either pattern of user defined pattern. Drawing can use brush or airbrush. Brush shapes can be defined and stored. Airbrush sprays colour/pattern randomly with four jet sizes and even or center spread. Colour cycles. Colour protection to stop particular colours from being overwritten by selected drawing actions. All standard drawing facilities like: rubber, straight pencil lines, triangles, circles, ellipses, rectangles, parallelograms, polygons, etc are provided. All shapes can be solid or just a boundary line. Once a shape has been set up it can be repeated anywhere on the screen. Global colour replace in a rectangle. Powerful fill facility for areas and vertical/horizontal lines. Full cut and paste of rectangular areas with rotation and size with screens from Watford Beeb Video digitiser. Load and Save screens with colour pallet information, save brush and pattern definitions etc.

Take The Guesswork Out of Selecting a Mouse Package

With reviews like this how can you go wrong.

Popular Computing Weekly, 9-11 June '87

"What you actually get for your money is a well built, three button mouse (far superior to the AMX mouse)."

"Overall the combination of a quality mouse and decent art package gives Watford Electronics a real chance of supplanting AMX as mouse supremos."

Micro User June '87

"Quest Mouse and Quest Paint can hold their heads high in the market. . ."

A&B Computing June '87

". . . Watford Electronics, a company famed for excellent hardware add ons and versatile software packages. Called Quest mouse, "this is a very special mouse driven drawing package..."

". . . you will have one of the most comfortable and professionally built mice I have used in a long time. The buttons are responsive, the mouse movement is smooth and without directional bias – a pleasure to use."

"What we have here is probably the best art package there is for the BBC Micro . . ."

"Quest Paint is a major leap forward in BBC programming. . ."

"Quest Paint is an original piece of programming, it is friendly and well endowed with many useful facilities. I would comfortably say it is easier to draw good pictures with Quest Paint than it is with more expensive 'Professional' art packages for the Atari ST and the Commodore Amiga. A recommended buy if you are looking for the best in BBC micro based art packages".

Acorn User, September '87

"The mouse (Quest) performs well in the face of competition from AMX, Wigmore and the rest . . ."

". . . this package represents excellent value for money. If you are interested in art then this program is for you to buy".

"Given time, I can see no reason why Quest Paint shouldn't take on the title of the definitive art package available for the BBC Micro to date".

"All in all, Quest Paint is a very professional package. It contains virtually every feature the budding artist could require".

"What makes Quest Paint so versatile is the addition of a sub-menu which allows you extensive control over each function".

"Until recently, Superart from AMS had been judged as the definitive mode 1 graphics package for the BBC micro. But now it has a serious rival in the form of Quest Paint, from Watford".

"As a measure of what is contained within Quest Paint, I would say it had all the features of Superart plus . . ."

"In most art packages, provision is given for drawing triangles and rectangles. Quest Mouse goes 14 better, allowing any regular polygon of upto 16 sides".

"One facility, not found on any other Art package to my knowledge, is the ability to access a digitiser from within the program". The reviewer concludes by saying, "The result is an extremely comprehensive and professional art package".

John Kilby, Head of Computer Science, Bishop Wulstan High School, Rugby, writes:

"Quest has been an excellent piece of equipment. The problem that seems to occur everyday is that at lunchtime the pupils rush to the computer room to make sure that they are first in the queue for the 'Quest' mouse".

Lt. Cln. C.G. Holton, G2 HQ 1 (BR) Corps, BFPO 39, writes:

"As ever your service is superb and the Quest Mouse proves every bit as good as the adverts claim".

Beeblet User Group, New Zealand Oct '87:

"One of its nicer features is that the top menu is done in Mode 0, the drawing itself is in Mode 1. Thus on screen together are two different Modes. A neat way around an old problem".

"PAN is used when a larger than one screen size image is required. The mind boggles at an A3 size drawing".

"I like it partly because of the mouse itself which is smooth and easy to handle but mainly I suppose because of the features I longed for and previously never got. Its easy to use with almost everything at your fingertips from the mouse. The software is simple where needed and complex where complexity is required".

ConQuest

Watford's Quest package is an extremely powerful and flexible drawing package, with very wide and unusual features. However, since its launch various suggestions for even more advanced & powerful facilities were received from the Quest users. ConQuest allows you these more advanced facilities, like, distortion of a cutout to any shape and a full font designer. If you also have a GXR ROM in your machine or you are using a BBC Master then ConQuest will take advantage of this to give ellipses at any angle, sectors and arcs, etc. Quest combined with ConQuest and Acornsoft GXR ROM make up THE MOST POWERFUL drawing packages available for the BBC range. Quest Paint is able to take advantage of almost any additions to your machine, such as Shadow or Sideways RAM. ConQuest takes this principal even further, by utilising the otherwise normally incompatible Sideways RAM facility by holding pictures in them.

Some of the features are:

- *Pick filenames off the screen for loading and saving.*
- *Rotate a cutout to any angle and Distort it to any four sided shape.*
- *Has Built in Font editor.*
- *Default brushes and patterns on startup.*
- *16 x 16 font available on start up.*
- *Ability to reset patterns, fonts and brushes to default at any time.*
- *ROM based enhanced Epson and compatible printer dump.*
- *ROM based enhanced extended picture routine.*
- *Ability to create and abort extended pictures.*
- *Improved disk access speed for extended pictures.*
- *User definable sideways RAM driver for incompatible sideways RAM systems.*
- *Ellipses at any angle on Master 128 (or B with GXR ROM).*

QUEST MOUSE & QUEST PAINT	***£59***
QUEST MOUSE, QUEST PAINT, AMX PAGEMAKER & PAGEFONT	***£85***
QUEST MOUSE ONLY	***£29***
QUEST PAINT SOFTWARE	***£32***
QUEST FONT DISC	***£12***
ConQuest 32K ROM Package	***£29***
QUEST MAT	***£3***
Part-exchange your old Mouse for a New QUEST MOUSE for only	***£23***
GXR ROM for BBC Micro	***£22***

N.B.

1. Quest Paint supplied complete with Software in a 32K ROM, Comprehensive User Guide and a Utility Disc.

2. Quest Font Disc has 22 text FONTS for use within Quest Mouse.

MARK II LIGHT PEN

Our Mark II Light Pen is the very latest in light pen technology. It is totally insensitive to local lighting conditions and works with many different monitors. The pen only responds to the High Frequency light produced by your monitor/TV. An LED indicates when valid video data is being produced. A conveniently located switch is also fitted.

Price Only £21

(Price includes FREE software Disc and Operating Manual)

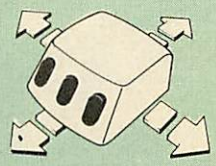
RB2 Marconi Tracker Ball

RB2 (AMX/Quest compatible)	£52
RB2 including Quest Paint	£78

FLEET STREET EDITOR

Software pack for BBC Micro	£33
Software pack for the Master	£39
Software Pack for Compact	£40
Admin Xtra Disc Utility	£13
Walt Disney Disc Utility	£13
Fonts N Graphics Disc Utility	£13

THE NEW Mk III AMX MOUSE



ONLY: £59 Inc. Super Art package
(carr £1.50)
(Please specify for BBC, Master or Compact)

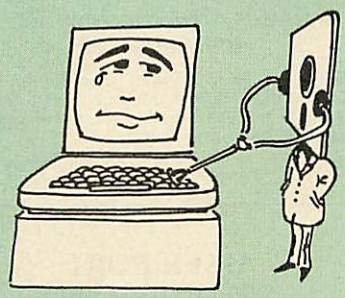
FREE our popular Colour Art software pack worth £15 with every AMX Mouse package purchased from us.

AMX MAT	£3
AMX MOUSE ONLY	£29
AMX UTILITY Package	£11
AMX SUPERART Package	£34
AMX STOP PRESS – A Desktop publising software. Works with Keyboard, Joystick or a mouse	£32

We are giving away absolutely FREE, our PAGE-FONT disc with every purchase of STOP PRESS from us.

PAGE-FONTS – Over 20 Fonts for use with AMX Pagemaker	£12
AMX DESIGN (ROM)	£55
AMX 3D ZICON Disc	£19
AMX XAM Educational	£15
AMX EXTRA EXTRA	£16
AMX MAX A gem of desktop (ROM)	£15

DIAGNOSTICS DISC



The BBC Micro is a very complex machine and thus diagnosing a fault can be very difficult. At Watford Electronics, we realise how difficult it can be when faced with a problem, finding yourself a long way from your nearest dealer, or even just uncertain about your Beeb's health, but not wanting to waste time and money taking it to be looked at.
The solution to these problems is here now, in the form of the Watford's Diagnostics Disc. This excellent utility is specially designed to test out the following areas of your Beeb:
RAMs, ROMs, ULAs, Sound, Keyboard, Disc, RS423, ADC, User Port, Printer Port, Cassette, Joysticks, Speech, Disc Drives, 6502 and Z80 2nd Processors.
This utility is an invaluable aid for all those who take the reliability of their system seriously. A comprehensive manual provides full operating details and a list of possible causes and remedies for any faults that you may find along the way. The package also enables a permanent equipment and service record to be maintained.

Only £20.00

BEEB VIDEO DIGITISER

Using any source of composite video (colour or monochrome) and the Watford Beeb Video Digitiser, you can convert an image from your camera into a graphics screen on the BBC Micro.

This uses the full graphics capacity of the BBC micro in modes 0, 1 or 2. The video source may be a camera, video recorder or television, and is connected via the video output socket.

Images produced can be compressed, stored to disc, printed on an Epson compatible printer, directly used to generate graphics, analysed for scientific and educational use or converted to other formats e.g. Slow Scan TV or receiving a picture from a remote camera using a modem.

The output from the digitiser exactly matches the graphics capability in each mode, with up to 8 levels of grey in mode 2. The unit connects into the User Port and automatically scans a complete picture in 1.6 seconds.

Both the black and white levels can be adjusted manually for the optimum picture, or switched to automatic for unattended use. The image produced can be reversed if necessary.

Full controlling software is supplied on a normal sideways ROM and this is easily accessed via additional * commands. The package i designed to allow easy input of complex screens and give full access of the data to the user. Once on the screen, the image can be used as a normal graphics screen, allowing any of the usual graphics commands in BASIC or other ROMs to work on it.

A special print dump routine is included with the driver programs. This is specially designed to produce a fast, correctly proportioned picture, with reduced "contouring", resulting in an accurate reproduction of the original image.

Detailed examples of driving this unit from BASIC or other languages are all provided in the extensive manual supplied.

£109 (Carr. £3)

(Price includes) Digitiser Unit, Software in ROM & a Comprehensive Manual)
(BBC B+ and Master compatible, except Master with Econet)

Magazine Maker

(As seen on TV)
A combination of the Pagemaker and Watford's Beeb Video Digitiser.

Using any video that provides a composite signal and the digitiser, images from a camera or TV can be converted into a graphics screen on the BBC Micro.

They can then be used within Pagemaker to illustrate magazines or newsletters – in fact anything that needs to be created on A4 size paper.

With Pagemaker's many features, a variety of pictures can be composed – the only limit being the imagination.

Pictures can be doctored using Pagemaker's graphics option to produce any number of effects.

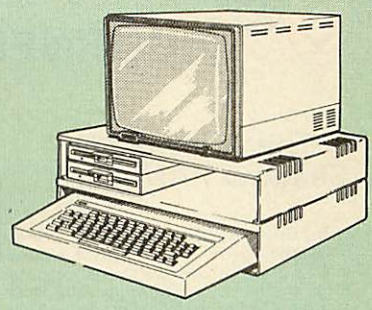
Text can be formatted around the digitised photo on screen using the facilities available, which include 16 typefaces, character and pattern definer, text formatting and the ability to load in wordwise and viewfiles plus much more.

Once created the picture can be printed out.

The Magazine Maker is suitable for any use that requires illustrated documents.

Complete Package **£135.00** (carr. £3)

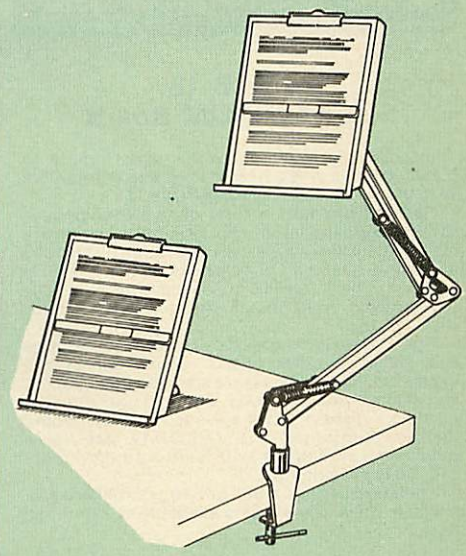
PLINTHS FOR BBC MICRO, MASTER & PRINTERS



Protect your computer from the weight and heat of your monitor. The BBC micro plinths have slots for maximum ventilation. The single plinth is suitable for a BBC and monitor, whilst the double height version provides enough room for our stacked or side-by-side dual disc drives or TORCH Disc pack, to be placed in the centre section. If you use our stacked drives, the remaining space can be used for further peripherals e.g. Speech Synthesizer, EPROM programmer or simply stationery. The computer slides neatly in to the lower section allowing easy access to remove the lid. The printer plinth is equally sturdy but without the cooling slots. It allows for access to the paper from the front as well as from the rear, (a facility not often thought of in similar products) if the paper is located beneath the plinth. This is a very convenient way to work especially if your work area is not deep enough to take the printer and paper separately.

SINGLE BBC PLINTH	**£11** (carr. £1.50)
DOUBLE BBC PLINTH	**£19** (carr. £3.00)
PRINTER PLINTH	**£10** (carr. £1.50)
SINGLE MASTER PLINTH	**£14** (carr £1.50)
DOUBLE MASTER PLINTH	**£24** (carr £3.00)

COPY HOLDERS



How often have you been about to type hand written notes into your computer when you find that there's nowhere to rest the paper or that your notes are resting at the wrong angle to read the type? Whether the notes be your latest program or the draft of a new trilogy, the new Manuscript Holders from Watford are superb for holding your paper at the ideal height and angle to allow you read and type in ease and comfort.

Available in 2 versions, desk resting and shelf clamping versions, these two units hold your paper firmly by means of a plastic retaining ruler and a clip grip. Both units are full A4 size.

Amazing value at only
Desk Top **£10** (carr. £2)
Angle poise **£14** (carr. £3)

Continued

ARIES CORNER

The Aries B-32 Shadow RAM Card

Like the BBC B+, the B32 provides 20k of shadow screen RAM and 12k of sideways RAM. Unlike the B+, the B32 has simple software commands which allow the user to reconfigure the RAM as 16k of shadow RAM and 16k of sideways RAM, or all 32k as sideways RAM.

With the B32, the programmer gets up to 28k of RAM available for Basic, Logo, Comal, Forth, Lisp and BCPL programs in any screen mode. The business user gets extra memory for View, ViewSheet, Wordwise Plus, Interword and many other applications. For advanced applications, the scientific user gets access to a massive 47k of data storage using the Acorn approved *FX call.

Sideways RAM enables you to load sideways ROM images from disc, allowing you to have a large library of sideways ROMs (subject to the copyright holder's permission) stored on disc. The B32's sideways RAM can also be used to extend any operating system buffer (such as the printer buffer) or to load tape programs into a disc system.

The B32 simply plugs into the 6502 processor socket on your BBC micro – no flying leads to connect and no soldering. Provision of the on-board ROM socket means that the Aries-B32 control ROM does not use up one of your existing ROM sockets.

- Recommended by Computer Concepts for use with their Inter series of ROMs.

Price: **£80** (carr. £2)

CREDIT CARD 24 HOUR
Ansaphone Hot Lines
(0923) 50234 or 33383

Aries B-12 Sideways ROM Board

This board is extremely well made, simple to install, reliable when fully loaded and compatible with the Aries-B20 and the Aries-B32

The B12 provides a total of twelve sideways ROM sockets (the four in the original machine are replaced by the twelve on the board), all fully accessible by the MOS sideways ROM system. In addition, there are two sockets for sideways RAM, giving up to 16k of RAM using 6264 static RAM chips.

The B12 system consists of two parts: a large detachable "mother board" which carries the extension ROM sockets and a small "base board" on a short ribbon cable, which plugs into the existing sideways ROM sockets. This two-board design eliminates the reliability problems previously associated with some other ribbon-cable based systems.

If you do not have a B32 or B20, a small adaptor module (the Aries-B12C) is available at a nominal cost.

Price:	Aries B-12	**£40**
	Aries B-12C	**£5**

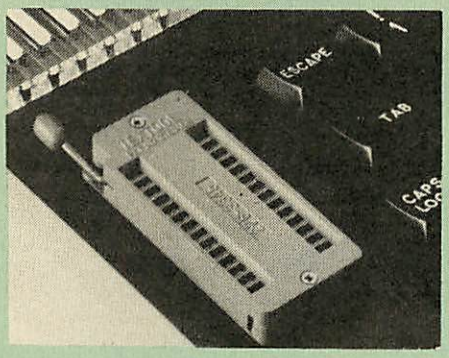
ARIES B-488 IEEE-488 INTERFACE UNIT

The Aries-B488 is an interface unit to enable the BBC micro to control and monitor IEEE-488 bus systems. The IEEE-488 bus (also known as the 'GPIB' or 'HP-IB') is the standard method of interconnecting programmable laboratory instruments and control equipment. Using the B488, up to 15 devices may be connected in a single high-speed data network.

£238 (Carr £3)

All prices in this advert are exclusive of VAT.

SIDEWAYS ZIF SOCKET



Allows you to change your ROMs quickly and efficiently, without opening the lid. The ZERO INSERTION FORCE (ZIF) socket is located into the ROM Cartridge's position.

- Very simple to install. NO SOLDERING required. The ZIF (Zero Insertion Force) eliminates the possibility of damage to your ROM pins when inserting & extracting.
- The low profile of the socket allows unrestricted access to the Keyboard.
- All data and address lines are correctly terminated to ensure correct operation of suitable ROMs with the BBC micro. We also supply a purpose designed see-through storage container with anti-static lining, allowing you to store up to 12 ROMs, protecting them from mechanical and static damage.
- This versatile hardware solves the problem of running out of socket space. Simply lift the ROM from the ZIF & insert a different one (No pulling or pushing of Cartridges. It is a must for all professionals and Hobbyists alike.)
- BBC, B+ and Master compatible.

ONLY **£16** (carr £2)

Low Profile CARTRIDGE SYSTEM

Complete System consists of: Low profile ROM Cartridge, Socket housing, Cable assembly, 5 labels and a library storage rack for the BBC B.

● Complete System	**£11**
● Spare Cartridges	**£2.50**
● Spare Rack	**£1.50**

ROM Cartridges for the BBC Master
Twin **£7.50;** Quad **£12**

16K Sideways RAM Modules

Complete with such features as read and write protection, these new modules from Watford Electronics are ideal for the hobbyist, software developer and ROM collector.
Key points to note about this new addition to the Watford range of products are:

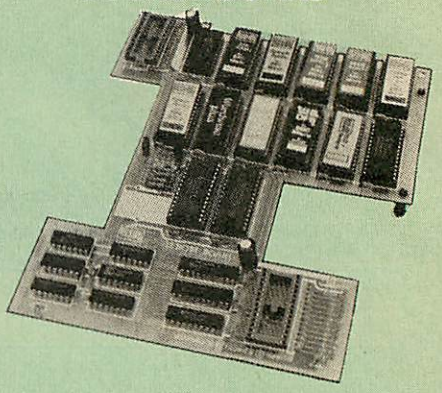
- Write protection (useful in a variety of circumstances).
- Read protection (allows recovery from ROM crashes).
- Compact construction.
- May be fitted in systems even with a ROM board.
- Multiple units may be fitted, even with a ROM board.
- No overheating or overloading problems.
- Free utilities disc supplied.
- Can be used as a 16K PRINTER BUFFER.
- Ideal for professional software development.
- Supplied with utilities software disc.

Only: **£24** (carr £2)

Optional extras

READ and WRITE protect Switches **£2** each
Battery for Battery Backup **£3**

SOLDERLESS SIDEWAYS ROM SOCKET BOARD



In the May 1986 Micro User's independent review, the writer concludes, "The board has been well laid out. Its position is much better than others – not over the HOT RAM chips and further away from the disc controller area". "I give the solderless ROM board the thumbs up and wish it success".

This brand new board from Watford Electronics is designed specifically for those wishing to add a ROM board to their own BBC without the need to perform any soldering.

This new board expands the total possible number of ROMs in a BBC from 4 to 16.

Unlike our competitors inferior boards, the ONLY upgrade required for fitting battery backup to the Watford Solderless ROM board (all Watford ROM boards, actually) is the fitting of the battery itself. (No other expensive components are required.)

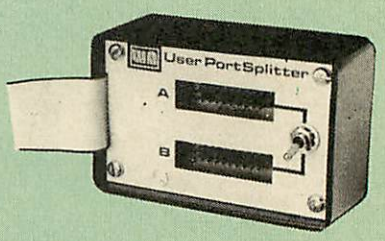
- The key features of this new, no fuss, easy to install quality product from BBC leaders Watford Electronics are as follows:
- Increase your BBCs capacity for ROMs from 4 to 16.
- **No soldering required.**
- Very low power consumption.
- Minimal space required.
- Compatible with Torch, DDFS, RAM Card, 2nd Processor, etc.
- Socket 14 takes two 6264 RAM chips.
- Read protect to make RAM "Vanish") allows recovery from ROM crashes.
- Battery backup option for RAM chips.
- Supplied ready to fit with comprehensive instructions.

Price: Only £32
Battery backup fitted **£36**
Battery Backup only **£3**
(carriage £2)

- Sideways RAM Utilities Disc for Solderless ROM Board. Includes the options to load and save ROM Images and the facility to use Sideways RAM as Printer Buffer.

Only: £8

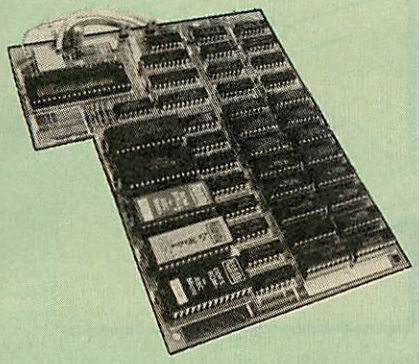
USER PORT SPLITTER UNIT



Gone are the days when you had to plug and unplug devices from the User Port. This extremely useful little device allows two units to be connected to the User Port simultaniously, and select between them simply by toggling a switch. This device is particularly useful for those people using Quest Mouse and the Watford Video Digitiser or any similar combination.

Excellent Value at **£21** (carr £2)

ROM/RAM CARD



Watford Electronics announced the first ever commercial ROM board for the BBC micro, the Watford Electronics 13 ROM Socket Board 3 years ago. Following the success of this board, we have designed what probably represents the ultimate in expansion boards, the new Watford Electronics ROM/RAM board. This highly versatile and sophisticated board represents the latest in "2nd generation" sideways ROM technology for the BBC micro, designed to satisfy the serious BBC user.

- NO SOLDERING required to fit the board.
- NO overheating problems.
- No User Port corruption (avoids problems with the mouse, modems, Eprom Programmers, etc.)
- Fully buffered for peace of mind.
- Firm mounting in BBC micro.
- Compatible with all BBC micros (not BBC+ or Master).
- Total number of ROMs increased from 4 to 8.
- Up to 8 banks of sideways RAM (dynamic).
- Option for 16k of Battery backed CMOS RAM (CMOS RAM needs one ROM socket).
- Software Write protect for ALL RAM.
- Read protect for CMOS RAM (ALLEVIATES crashes during ROM development).
- Separate RAM write register (&FF30 to &FF3F).
- Automatic write to currently selected RAM socket for convenience.
- Accepts any ROM.
- FREE utilities disc packed with software.
- Compatible with our DDFS board, 32k RAM Card, Delta Card, sideways ZIF, etc.
- Large printer buffer.
- UNIQUE Fully implemented RAM FILING SYSTEM (similar to the popular Watford DFS).
- ROM to RAM load and save facilities.

The SFS (Silicon Filing System) can utilise up to the full 128k of RAM (with the SFS in any paged RAM) as a SILICON DISC. This behaves as a disc drive, with all the normal Watford DFS features (including OSWORD &7F for ROM-SPELL, etc.) to provide an environment that looks like a disc but loads and saves MUCH faster.

The ROM-RAM Board plugs into the 6502 CPU socket. This leaves free all the existing ROM sockets, which can still be used normally.

Any ROM that can be plugged into the BBC micro's own ROM sockets may be used in the ROM-RAM Board.

The ROM-RAM Board is supplied with all ordered options fitted as standard. Upgrade kits (with full instructions) are available for all of the options, for later.

Please write in for further details.

INTRODUCTORY PRICES:

- ROM/RAM card with 32k dynamic RAM ***£45***
- ROM/RAM card with 64k dynamic RAM ***£59***
- ROM/RAM card with a massive 128k dynamic RAM **£89**

(carriage on ROM-RAM Card £3)

OPTIONAL EXTRAS:

- 16k plug-in Static RAM kit.....**£9**
- 16k Dynamic RAM for Upgrade.....**£9.20**
- Battery backup.....**£3**
- Read and Write protect switches.....**£2** each

Complete ROM-RAM board
All options installed **£106**

P.S.
Is your existing ROM Board overflowing with ROMs? Do you need more Sideways RAM? Is your Board unreliable? Then upgrade to Watford ROM/RAM Board and pay £5 less

Le Modem

The MODEM from Watford

At last a professional MODEM for the BBC Micro. Unlike other 'Modem packages' this is a complete package there are no extra software costs to get 'up and running'. Of course Le MODEM is multi-standard, i.e. 300/300, 1200/75 & 75/1200 UK and BELL (USA) are all supported.

The features that make Le MODEM such good value are:

- *A complete communications terminal that transforms your BBC Micro into a very powerful World-wide data transfer system.*
- *Auto Dials, Auto answers, and is completely controlled by your micro. There are no external controls!*
- *Allows you to access PRESTEL, B.T. GOLD, THE SOURCE, MICROLINK, MICRONET, MICROWEB, THE TIMES NETWORK, MICRO LIVE (BBC TV database), CITY BB and more.*
- *Designed to be SIMPLE but SOPHISTICATED. To LOGON to a data base all you have to know is its TELEPHONE NUMBER, Le MODEM does the rest.*
- *Supplied with a comprehensive telecomms package in a 16K sideways ROM which includes a FULL PRESTEL terminal allowing TELE-SOFTWARE to be downloaded.*
- *A comprehensive 80 column terminal. This includes XMODEM error checked transfer protocol, to allow error free data transfer anywhere in the world!*
- *FULLY controlled by simple '*COMMANDS allowing you to control it from your own BASIC programs. To get you started we supply a FREE disc of bundled software!*
- *Connects to the 1MHz bus. A *AUDIO ON-OFF command allows you to actually hear the telephone line through your BBC micro loudspeaker.*
- *Completely self contained with internal mains power supply. (Even a free mains plug is fitted!) A *TEST facility gives ON SCREEN indication that Le MODEM is working correctly.*
- *Packaged in such as way that you need nothing else except a BBC Micro to communicate with computers all over the world.*
- ***FREE Registration to MicroLink.***

SPECIAL OFFER

Price: ***£88***
(carr £3)

(Price includes, Le Modem, Software ROM, Cables & Comprehensive Manual)
(Write in for further details)

Minerva Systems Software

System Delta with Card Index	£55
System Programmers Ref. Guide	£19
System Gamma	£43
System Gamma Prog, Ref, Guide	£19
System Mailshot	£17
System Reporter	£17
System Intrer/View Link	£17
System Sales Ledger	£39
System Purchase Ledger	£39
System Nominal Ledger	£48
System Stock Management	£39
Order Processing/Invoicing	£39

APOLLO

The NEW Modem from Watford

Following numerous requests from you, our discerning customers for an APPROVED, Low Cost & High Performance modem with Auto Dial & Auto Answer facilities as standard) we bring you the versatile APOLLO Modem. Just compare the features and look at the price (which incidentally includes the cost of the Software, manual and BBC connecting cable). We are sure you will agree that Watford Electronics in their traditional way are giving you a super 'value for money' deal.

Just look at these features:

- V21 for Bulletin boards, Microlink, Telecom Gold, etc.
- V23 for Prestel, Home Banking, and other Viewdata services.
- Reverse V23 allows User run Viewdata service.
- 1200-1200 half duplex for communications.
- XMODEM, HEX and ASCII file transmission.
- Auto Dial of given 'phone number.
- Auto Answer for User's Bulletin Board.
- 80 column terminal with split screen facility.
- Prestel text screen dump.
- Fully BABT approved.
- **FREE Registration to MicroLink.**
- **£6.50 off annual Membership to Micronet, Prestel and Telecom Gold.**

The Apollo is attractively finished in matt black. It opens the doors to world communication to both, the Hobbyist and the Professionals alike. With baud rates varying from 300/300 Originate and Answer, 1200/75 and 75/1200 full duplex and 1200/1200 half duplex, virtually all the popular tele-services can be accessed. A comprehensive Comms ROM oversees the use of the APOLLO, providing simple commands for all the software controlled facilities. APOLLO is an ideal modem for both the first time buyer and the seasoned user. Join the Telecommunications Revolution – Buy a Watford APOLLO!

Only: **£88** **(Carr £3)**
Price includes, the Modem, Comm Software Cables & Operating Manual).
(Write in for full specification)

VOLTMACE JOYSTICKS

Delta 3B Single Joystick	£12
Delta 3B Twin Joysticks	£17
Delta 3C Joystick for Compact	£10
Delta 14B Single Joystick	£12
Delta 14B/1 Adaptor Module	£12
Transfer Software Disc-Tape	£7

ATTACHE CARRYING CASE

For the BBC Micro. Attractively finished in antique brown leatherette. Lockable.
Only **£10** (£2 carr.)

Versatile BEEB SPEECH SYNTHESISER Unit

The Watford Speech Synthesiser is a very flexible speech synthesis unit based upon the powerful phonemes system. This system stores the building blocks of speech (called phonemes) and allows you to combine them quickly and easily to form virtually any word imaginable.

Supplied with an advanced ROM, you are provided with a 500 word dictionary to get you started. These can easily be added to by following the notes given in the comprehensive manual.

SPECIAL PRICE £32 (carr £2)

Continued

COMPUTER CONCEPT'S ROMS

ACCELERATOR	£46
CARETAKER Basic Utility	£23
DISC DOCTOR	£28
Graphics ROM	£29
TERMI	£25
COMMUNICATOR	£49
SPEECH ROM	£24
Printmaster	£25

Wordwise £23

Wordwise plus £40

We are giving away absolutely **FREE**, the superb Word-Aid ROM worth £24, with every WORDWISE PLUS package bought from us.

Word-Aid

The most comprehensive utilities ROM for Wordwise-Plus

Extend the power of your Wordwise Plus word processor with this most advanced ROM from Watford. By utilising the powerful Wordwise Plus programming language, WordAid provides a whole host of extra features, all accessed via a special new menu option. This ROM has been personally approved by Mr Charles Moir, the author of WORDWISE PLUS.

- Alphabetical sorting of names and addresses.
- Text transfer options.
- Chapter marker.
- Epson printer codes function key option.
- Search and display in preview mode.
- Embedded command removal.
- Print Multiple copies of a document.
- Multiple file options for print and preview.
- Address finder.
- Label printer.
- Mail-merger.
- Number/delete/renumber.
- Clear text-segment area.
- BBC B, B+ and Master compatible.

Only £24

(N.B. Word Aid requires a Disc Interface in your Micro)

HI-WORDWISE-PLUS DISC: £5

SPELL MASTER £42

Inter SHEET ONLY £37

INTER-CHART ONLY: £25

Inter-WORD £36

MEGA-3 ROM

Interword, Intersheet & Interchart – 3 in one ROM £76

INTERBASE £49

All Prices Exclusive of VAT

VIEW

VIEW WORDPROCESSOR 2.1	£35
VIEW 3.0 ROM	**£48**
VIEW PROFESSIONAL	**£79**
HI-VIEW (for use with 6502 2nd Processor)	£36
VIEW Printer Driver Generator (Please specify Disc or Cassette)	£9
VIEWSHEET (Acornsoft)	£36
VIEWSTORE	£36
VIEWSPELL with 80 track disc	£29
VIEWPLOT Disc (Please specify for Master 128 or Compact)	£20
VIEW-INDEX	£12
OVERVIEW Packs 1 & 2 for the Master	£72

Watford's own Sophisticated VIEW PRINTER DRIVERS

Epson FX80 & Kaga KP (Disc)	£8
Juki & Brother HR15 (Disc)	£8
Silver Reed Printers (Disc)	£8

ADVANCE COMPUTER PRODUCTS' ROMs

Adv. Disc Toolkit	£29
Adv 1770 DFS for Mast/Compact	£29
Adv 1770 DFS for BBC/BBC+	£29
Adv Disc Investigator	£24
Adv. Control Panel	£29

MINI OFFICE II

DISC Version for BBC B & B+	£14.00
DISC Version for BBC Master	£16.50
ROM Version	£43.00

(When ordering please specify for which Micro & 40 or 80 track Disc).

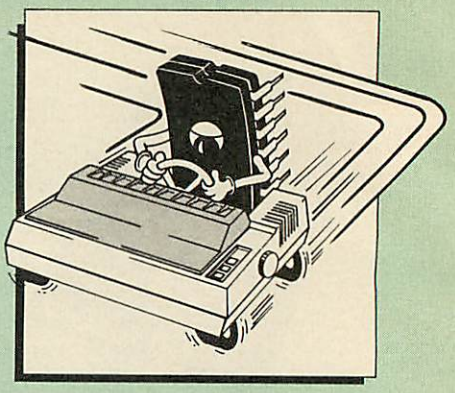
REPLICA 3

This new improved REPLICA 3 from Clares is a very powerful disc based TAPE to DISC Utility. It now transfers even more programs than ever before. Replica 3 will not work with all programs but then neither will anything else. 30,000 Replicas have been sold to date. It has to be good.

£15 (40 or 80 track)

Acorn's Speech Synthesiser package, complete
Special Offer £18

VIEW PRINTER DRIVER ROM



View is a powerful word processor, but until now has seriously lacked in terms of printer support. With the launch of our Printer Driver ROM, which includes an extremely powerful and easy to use Printer Driver Generator, View users can find themselves in the realms of advanced word processing only at a small outlay.

The VPD extends View's printer command with a series of mnemonic commands. All standard highlight sequences are also supported. A large range of printers are supported by drivers contained within the ROM (the drivers can be downloaded and customised). Printers supported include: Epson's MX, RX, FX, FX, LX, JX80 range, HI80, KP810/910, PW1080, JP101, HR15, M1009, GLP, Panasonic KX-P1081/2, JUKI 6100, etc.

Other printers are readily supported by defining a Printer Driver using the built in Printer Driver Generator. The features mentioned below are available to both the built in Printer Drivers and user defined drivers (assuming the printer supports the features).

NLQ control, Underline, Bold, Proportional Spacing, Microspacing, Italic, Superscript, Subscript, Condensed, Enlarged, Double Strike, Set lines per inch numerically (e.g. LPI 6), Set characters per inch numerically (e.g. CPI 5), Select printer font, Select printer ribbon colour, Translation sequences, Emulation of BBC Character Set, Simple numeric expressions for certain operations, Full printer setup, Send control codes, Print prompt on screen, Redefinable Pad character, Pause for key press, Prompt to change daisywheel, and Execute * command when printing.

Other features include a very powerful on screen preview, with bold, italic, underline, super/subscript, enlarged highlights, and a special printer driver to allow memory based text to be previewed by View 1.4. Of course, View 1.4, 2.1 and 3.0 are all supported, as is Shadow RAM and 6502 Second Processors. The BBC B series and Master series of micros are supported. A comprehensive manual is supplied. All in all, a very professional product for the discerning user who wants power at their finger tips. (Write in for a detailed leaflet).

Price: Only £33

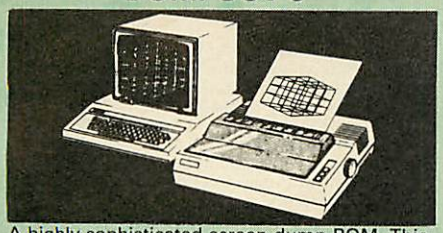
Harness the full potential of your Epson RX or FX printer. The NLQ ROM makes Epson printers produce Near Letter Quality output with optional proportional spacing, enlarged and underlined. Accessed by simple * commands from Basic, Wordwise and View (with driver) or almost any other language.

(Send an SAE for sample printout)

Only: £25

VIEW PRINTER DRIVER for NLQ ROM £7

DUMPOUT 3



A highly sophisticated screen dump ROM. This has to be the most flexible and powerful screen dump ROM yet produced for the BBC micro. It will put on paper anything you see on the screen, including full Mode 7 graphics.
Also provided are window setting utilities and OSWORD calls to plot and read Mode 7 graphics pixels.

Facilities:

- Vertical and horizontal scaling in all graphics modes and mode 7
- Rotation of image by 90, 180 or 270 degrees
- Left hand margin setting
- Screen dump window setting
- Colours appear as grey scale
- Two tone fast dump
- Colour mask
- Mode 7 contrast expansion
- Mode 7 contiguous dump
- Key triggered and User Port triggered dumps

The Micro User Feb. 1985.
'Without reservation I wholeheartedly recommend the Dump Out 3 ROM as the ultimate screen dump facility for the BBC Micro . . . it must represent excellent value for money and surely cannot be beaten".

For use with the following printers:

GLP, GP80/100/250, CANNON, STAR, KAGA/TAXAN, NEC, SHINWA CP80, GEMINI, EPSON MX/RX/FX, M1009, NEC PC8023, DMP100/200/400, Panasonic KX1081/82, Mannesman Tally and compatibles.

Only: £25

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Popular Educational Software

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- A Vous La France Disc **£21.50**

THE NLQ DESIGNER

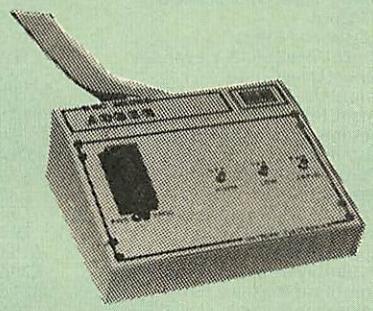
(The First & still the Best)
Supplied with over 25 Different fonts

A massively useful utility for users of the Taxan/Kaga KP810/910 or the Canon PW1080. This program allows you to define NLQ character sets to download into the printer's memory. Full on screen editing of the font. Requires 6264 RAM chip to be fitted in the printer.
Supplied with disc containing over 25 example fonts. (Please specify 40 or 80 track when ordering.) Fonts are: Italic, Courier, Courier Italic, Script, Copper Plate, Shadow, Bold, Double Print and Gothic etc. (P.S. This ROM is not suitable for Epson printers.)

- NLQ Designer ROM, FONT Disc and Manual **£25**

(Write in for further details on all above ROMS)

ADDER



The only low cost EPROM Programmer for the BBC Micro that will program both the standard 21V and the new 12V5, 27128 EPROMS.
Adder is the ultimate EPROM programmer for the BBC Micro. It will program many different EPROMs up to the very latest 27256 32K devices.
The Adder unit connects to the User Port and draws its power from there too. The EPROM is mounted in a top quality ZIF socket. There are no switches or controls as Adder is entirely software controlled.
The Adder software provides sophisticated facilities for programming EPROMs from a RAM image produced by loading disc files. The software is menu driven and designed for ease of use.
Features:

- Two ultra fast programming algorithms or standard slow algorithm.
- Supports standard 21V programming and newer 12.5 volt EPROMs. (Software switched).
- The RAM image to be programmed can be built up in many ways. Sections of image can be loaded separately. Part programming. Read EPROM. Edit data in memory.
- Automatic processing to handle a list of files to program into the EPROM.
- Automatic disc buffering to allow programming of 32K 27256 devices from a 32K file without extra effort.
- Verification gives detailed error list and checksums are maintained. There is also a blank check facility.
- Works with all standard filing systems. Generates header code for RFS ROMs to allow Basic programs etc. to be stored in EPROM. More than one file per ROM permitted.
- Programs the following EPROMs: From 2K to 32K: 2516, 2716, 2532, 2732, 2764, 2764A, 27128, 27128A, 27256 (Both 12.5V and 21V).

£75 (£3 Carr)

TEX EPROM ERASERS

EPROMs need careful treatment if they are to survive their expected lifetime. Over erasure of EPROMs very rapidly turns them into ROMs! The TEX erasers operate following the manufacturers specifications to give the maximum possible working life by not erasing too fast. We use these erasers for all our own erasing work.

- **ERASER EB** – Standard version erases up to 16 chips. **£28** (carr £2)
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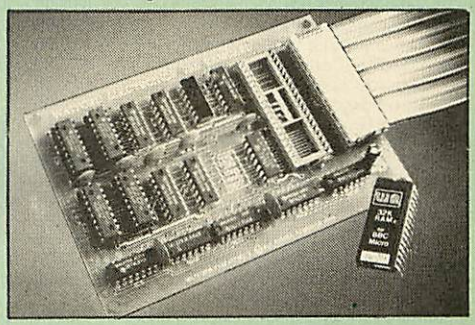
- Spare UV tubes. **£9**

32K
SHADOW RAM-
Printer Buffer
Expansion Board



A MUST FOR WORD PROCESSING

Watford Electronics now brings you the latest state-of-the-art MEMORY EXPANSION BOARD for your BBC microcomputer. Don't throw away your BBC B for a BBC B Plus or BBC Master. Just plug the ribbon cable into the 6502 processor socket, and fit the compact board inside the computer. Immediately you will gain not 16K or even 20K, but a massive 32K of extra RAM!!!

- IMPROVE your WORD PROCESSING system, whether disc or cassette based. Don't wait for a slow printer – type in text while printing. TWO JOBS DONE SIMULTANEOUSLY and £100+ saved on a printer buffer.
- "VIEW" Wordprocessor users can now type in letters in 80 columns and have up to 28,000 bytes free – 5 times as much as normal.
- In WORDWISE (or WORDWISE-PLUS), preview in 80 columns with the full 24K of text in memory. This product is recommended as an ideal complement by Computer Concepts.
- Combine GOOD GRAPHICS and LONG PROGRAMS. Use the top 20K of the expansion RAM as the screen display memory, leaving all the standard BBC RAM free for programs. Benefit from MODE 0/1/2 graphics and 28K of program space.
- Use the FULL 32K or the bottom 12K of the expansion RAM as a PRINTER buffer for PARALLEL or SERIAL printers, sound channels, RS423 etc. Print large text files while running long graphics programs, and have all your buffer options available as well (*FX15,21,138,145,ADVAL etc). Please note only a 12K printer buffer can be used with Wordwise or Wordwise-Plus, due to the way they are written.
- Unique facility to turn ROMs off and on again. Unlike all other ROM managers, this feature does not use 'unofficial' memory. Two bytes of normally user-inaccessible memory on the RAM card are used to ensure ROMs are disabled WHERE OTHER ROMS FAIL.
- Recommended by Computer Concepts for use with their Inter series of ROMs.

Only £59 (carr £2)
(Price includes a comprehensive manual and the ROM)

INCREDIBLE WORDPROCESSING DEAL

Watford's 32K SHADOW RAM CARD and Computer Concept's INTERWORD Wordprocessor package.

at Only **£89** (carr £2)

Continued

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THE COMPLETE BBC COMPUTER USER HANDBOOK

"Why has no-one written a book like this before? It's long overdue".

If you own a BBC-B, BBC B+, Electron, Master 128, Master Compact or Archimedes then this book is for you. It shows you how to get the most from your computer, and how to make the computer work for you. Although some sections are machine specific, most of the information, programs, hints and good solid experience are for the whole range of BBC machines. The general style and level means that both beginner and expert will feel satisfied with the quality and quantity of the material.

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HARDWARE – How to design your own work station. Hardware additions (disc drives, ROMs, printers, 2nd processors, etc). DIY alterations.

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Only: **£14.95**

THE WAPPING EDITOR

Watford Electronics bring professional quality Desktop Publishing to the Beeb. The Wapping Editor is a totally self contained mouse-driven desktop publishing package designed to run on the BBC B, B+ and Master computers. The massive 64K ROM contains ALL the software you need to do your own publishing. It 'Brings the Freedom of Press' to your fingertips. Its salient features are:

Graphics Package
This section is a fully functional word processor specially tailored to suit the Desktop Publishing environment. Gone are all the unnecessary and cumbersome text formatting commands – these are dealt with in the 'Page-Layout' section. Text input can of course be taken from existing word processor files like Wordwise, View, etc.

Page-Layout Section
Page Layout becomes easy using these mouse-driven routines. The user simply 'pulls' a rectangle onto the page and states which text document or graphic is required to fill the space – it's as simple as that! Text can be automatically printed in a pre-set number of columns, left justified and/or right justified, or centered. Several different typefaces can be held in memory at one time. Graphics may be stretched, squashed or cropped to fit any size rectangle. Graphics input can be from the software provided in the package or, using the 'mode convert', from any graphics mode screen.

The Font Editor
Allows editing of ALL 95 characters. As well as being able to design your own typefaces, fonts from other DTP packages or from Quest Paint may be loaded into the editor and converted for use with the Wapping Editor. Some of the numerous functions including slide, flip, invert and rotate individual characters or the whole font. Individual characters can be mirrored or copied and a mask feature allows you to superimpose two characters. Lines and columns can be inserted or deleted allowing the character to be stretched or squashed.

This package is the latest in the line of integrated professional quality mouse-driven software from Watford.

P.S. For details on Quest Paint and ConQuest, please refer to Page 7 of our advert.

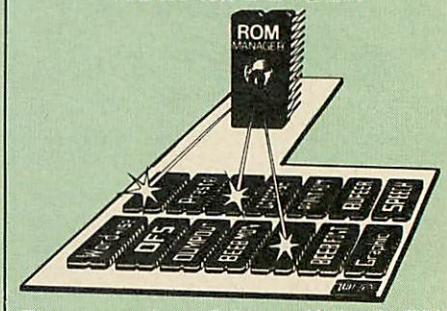
ROM-SPELL

Probably the most advanced and fastest spelling checker available for the BBC Micro. Compatible with View, Wordwise and Wordwise Plus ROMSPELL is simple to use with easy editing of incorrect words. Full facilities for editing the user dictionary to allow customisation to your personal needs. Dictionary includes over 30,000 words and is supplied with a Comprehensive manual.

NOT compatible with 1770 DFS.
(Please state 40 or 80 track disc)

Price still only: £25

ROM MANAGER



Take control of your Sideways ROMs with ROM Manager. This powerful utility ROM gives you power over your sideways ROMs. Disable whole ROMs, send commands directly to named ROMs and many other powerful facilities.

"Provides comprehensive management of all your installed ROMs". (BEEBUG November '84.)

ONLY £20

SURGE PROTECTOR Plug

Fitted in place of your normal mains plug, this device protects your equipment against mains surges. Nearby lightning strikes, thermostats switching and many other sources which put high voltage transient spikes on to the mains. This can lead to data corruption in memory and on disc and can result in spuriously crashing machines. A must for every computer user.

Protection for only **£7.50**

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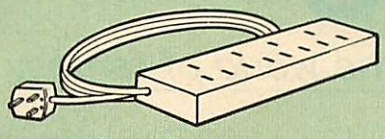

4 way top quality mains trailing sockets. Supplied wired up with mains plug ready for use. Can be screwed to floor or wall if required. Very useful for tidying up all the mains leads from your peripherals.

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SPIKES CLEANER UNIT

A 4 way mains distribution unit as above with a built-in Surge Arrester, providing protection for your complete computer system

£13.00 (carr. £1.50)

ROM EXTRACTION TOOL

This extremely useful tool allows you trouble free chip insertion and removal from your computer by distributing the removal force over the whole body of any 24 or 28 pin chip.

£2

Replacement FLEXIBLE 17 way Keyboard Connector £3

28pin DIL HEADER PLUG

SOLDER type **£1.50**; IDC CRIMP type **£1.95**

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Increase the speed of your Disc Drives by soldering this switch to your BBC B or B+ Keyboard.

Only **£1.00**

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Convert two single Disc Drives into one Dual Drive with this simple external unit (suitable for disc drives with PSU).

£14

Watford POWER DUCK £8

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(All ready made and tested)

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to 5 pin DIN Plug + 1 Jack Plug	£2.00
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DISC DRIVE POWER LEADS

Supply from BBC power supply to standard Disc Drive connector.

Single **£3.00** Dual **£3.75**

DISC DRIVE INTERFACE LEADS

BBC to Disc Drives Ribbon Cable

Single **£4** Twin **£6**

Miscellaneous Connectors

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RS423 (5 pin Domino)	40p	50p
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ECONET (5 pin DIN)	20p	30p
Paddles (15 pin 'D')	80p	200p
Disc Drive Plug 4 way	75p	–
6 way Power Connector	80p	95p

Watford Electronics are the main Approved Stockist of ACORN SPARES and Acorn ECONET Referral Centre

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Ideal for cleaning and preventing static build-up on TV/Monitor Screens.

£2.50

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This simple to use aerosol spray is ideal for removing Dust and Dirt deposits from the Keyboards and similar inaccessible places. **£3**

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Keyboard	£43	Speaker	£2
UHF Modulator	£4	Keyswitch	£1.50
Speaker Grill	£1	16MHz Crystal	£4
Power Supply	£56	32.768MHz Xtal	£1.00
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B B+

Countdown spells doom – again

Come with the Mad Hatter into the world of fantasy

RECENTLY I received a begging letter for information as to the whereabouts of Peter Killworth – described as *the great bard* – and his work. Consequently I was delighted when Topoligika sent me a disc of his re-issued adventure *Countdown to Doom.* I imagined that it wouldn't take me too long to romp around it in order to let you know how things were.

I was mistaken. Once again, as with the new **Philosopher's Quest**, there has been an expansion and enhancement sufficient to make the adventure a completely new challenge.

Countdown to Doom is a lovely brain teaser. It starts with a puzzle that even first-timers should not find too hard and then gently increases in difficulty and complexity in a way that seasoned adventurers will find very entertaining indeed. I've managed to get myself killed fairly frequently, and each time a consolation message containing puns that made me feel sick as a parrot has appeared on the screen.

The enhancement I like most is the time-travel one: It has situations very reminiscent of A.E. van Vogt's books The Weapon Makers and The Weapon Shops of Isher. I felt very like Captain Robert Hedrock as I met myself in another time level and handed myself a vital something.

Like the Isher books, Countdown to Doom now contains a see-saw and, although it's not a temporal one, it requires careful manipulation in order to get things bouncing along happily.

As a way of keeping the adrenalin flowing, the move counter updates your position every 10 turns. I strongly advise you to ignore this while you are initially exploring the adventure. There is absolutely no hope of anyone running through the game until the whole scenario is mapped and the puzzles have been sorted out in order of priority.

Those who already have the old version will be delighted with the new one and readers who do not have a copy at all should rate this as a must. Many hours of frustration and entertainment are packed on to this disc, yet the frustration need never become unbearable.

Beginners will find sympathetic help not only from the booklet on how to tackle adventure games, but also from the online clues and solutions provided with every Topologika adventure. Countdown to Doom is available on 40-track disc from Topologika, PO Box 39, Stilton, Peterborough PE7 3RL for £9.95.

Into the labyrinth

I have mentioned Roger White's treatment of **Labyrinths of La Coshe** several times in previous issues and at last I can begin to offer some

A tour of whales

A few readers have chided me for saying that the whale's innards in **Philosopher's Quest** are random, because lighting a match helps you work out where to go. The innards *are* random – I've tested them often enough and, as I mentioned to Peter Killworth, I omitted the match clue because I don't believe in spoonfeeding you too much.

That being said, here is a poem by Gabriel White, who has featured in this column before:

Did you really waste those matches that you found?
You surely didn't light them here and there and all around?
The innards of the whale ARE random – that at least is truth,
But what is needed is a match, not luck, to find the tooth.
'Tis here, inside Leviathan, the drifting smoke will show
The in-drawn breath, it's plain to see the way that you should go.
Please take, dear Hat, a line or two to set the readers right.
I think they'll bless you for it. Yours sincerely, Gabriel White.

Hatter's Helpline

I've had a heart-rending plea for help in **Elite** from S. Valentine who received his instructions at Vetitice, but had them wiped before he could read the name of the planet to go to. As a result, he has been fruitlessly wandering the galaxies ever since. Reesdice in Galaxy 1 is the answer.

He has a second problem concerning a cabin full of platinum. He quite rightly thinks he ought to be able to sell it for around Cr7000, but can only manage about Cr188. At a guess it's a problem connected with his mission – otherwise it's a bug I've never come across. Can anyone offer suggestions other than to cut his losses?

Sidhyartha Datta wonders if generation ships really exist? Well, I've not met one yet. And what sort of ship shows up when you press N on the loading screen? I call it a Shellback, because of its tough armour – but to be honest I don't know. He also asks if you can join the Navy. You get co-opted when you accept the first mission and the reward is a navy-class energy unit for successful completion.

Peter Miller has come to the rescue of Jonathan Day in **Mystery Funhouse** – a Scott Adams adventure. The OUT OF ORDER sign by the fortune telling machine is the answer to being killed at the shooting gallery. Leave it in the gallery before entering from the manhole.

Mary Fisher offers another way of running

account of his work. Roger is a member of staff in the Philosophy Department of Leeds University and his approach to adventuring is as far removed from the bash'n'slash school of thought as it is possible to go.

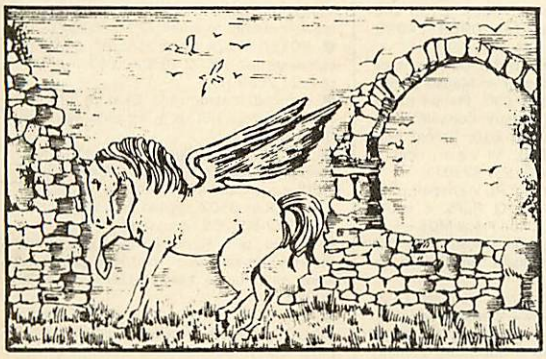
His solution runs to about 10,000 words, and would take about five months to cover in this column if I kept to that subject alone. Thus I shall be including only extracts with the aim of showing how the scholarly approach is effective in solving adventures. This is the start of Roger's solution:

The object is to collect all the treasures in an underground network of caves. There are 23, each with a different value and, in addition to the points scored for owning one, a further six are scored for storing the treasure in the grotto – the central location of the puzzle.

There are 95 further points to be won for performing certain actions necessary in order to collect the treasures, making a grand total of 379. Once you have accumulated all the points, you win by finally gaining admittance to the grottomaker's tomb.

Roger sets out the tasks to be performed in a way that is a model of clarity and he breaks the solution down as follows:

- *A list of the treasures*
- *A list of the other objects*
- *All the other scoring actions*
- *Notes on useless objects*
- *A description of the initial locations above ground*
- *Getting from the grotto to the caves and back*
- *The thief*
- *Weights*
- *Stabilising the round room*
- *Light underground*
- *Problems of movement*
- *The mazes*
- *Teleportation*
- *Travel to the tomb*
- *All other puzzles not so far covered including locations and problems for each treasure*
- *The endgame*



I defy any adventure to remain unsolved in the face of such a relentlessly logical approach. Indeed, some readers stuck in Labyrinths may well find help just from seeing how Roger breaks the game down into its constituent parts. More on this adventure next month.

Finally, I now have the solution to **Lords of Time** so I'll be featuring it soon. Until next month, happy adventuring.

Acheton on a Master 128: Insert the program disc in drive 0 and type:

```
*ADPLAY
```

The micro will try to run the file and then lock up. Press Control+Break and type:

```
?&2F3A=&D7
?&2F3B=&E2
CALL &2F23
```

The game will now load and run as normal.

Jack Holden is having trouble in **The Temple of Vran** – part of Incentive's Ket Trilogy – where he needs to cross the quicksand pit. Tie the vine to the cane, fire the bow and then SWING. That will get him across and into further trouble.

I've had a plea for help from Potters Bar. Tweedledee, as he/she wishes to be known, is a 15-year-old beginner and wants a list of suitable adventures of the not-too-easy/not-too-hard variety. What about **Hampstead** or a Larsoft adventure such as **Wychwood**?

For longer games I'd suggest either Robico's **Rick Hanson**, **Countdown to Doom** from Topologika or even Level 9's **Colossal Adventure** as the best replica of the very first adventure game, if it's still available. However, I'm nearer 51 than 15, so what do younger readers think?

A nice letter from Neil Shipman included the following tips: In **Golden Baton of the Sun**, simply throw the knife before collecting the baton and **Ghost Town**'s purple worm is simply a red herring.

Jonathan Collins offers comments on **Dodgy Geezers**, part 1. The correct gang to assemble is Soapy to locate the bank from the sewers, Mr. Video to open the safe and Tricks.

He advises lighting the lamp as soon as you get it and says that before going on the roof you should enter the bank. However he doesn't know how to proceed once he's got the gold: Who can help?

Anthony Gordon wants to amend his advice on **Labyrinths of LaCoshe** given to Kay Chappell in the April column: He's decided she has left one of the following actions undone: Wave the sword to create the bridge, turn the bust, kill the troll, rub the mirror, give the correct safe combination, solve the riddle, turn the bolt or kick the bucket. Anthony also offers advice to J. Collins. To ride Pegasus in **Perseus and Andromeda** the sequence is fix halter, mount Pegasus, ride Pegasus.

Basil Waterton tells me that the locked exit south of the Orange Lobby in the mathematical adventure **L** is just scenery. Can any reader help him with a solution to **Amnesia**?

PROBLEM CORNER

Neil Shipman is frustrated: He is two per cent from finishing Doctor Who and the Warlord but runs out of moves when he tries to kill the green minion.

What is the exact sequence of moves from the moment he gives the dispatches to the Duke of Wellington?

HALL OF FAME

Many thanks to Barbara Gibb and Craig Romans for their maps of Countdown to Doom. Congratulations to R. D. Goddard for sending me the full solution to Gisburne's Castle, and to Anthony Gordon for the first analysis of Adventure – that's more help I can offer frustrated adventurers.

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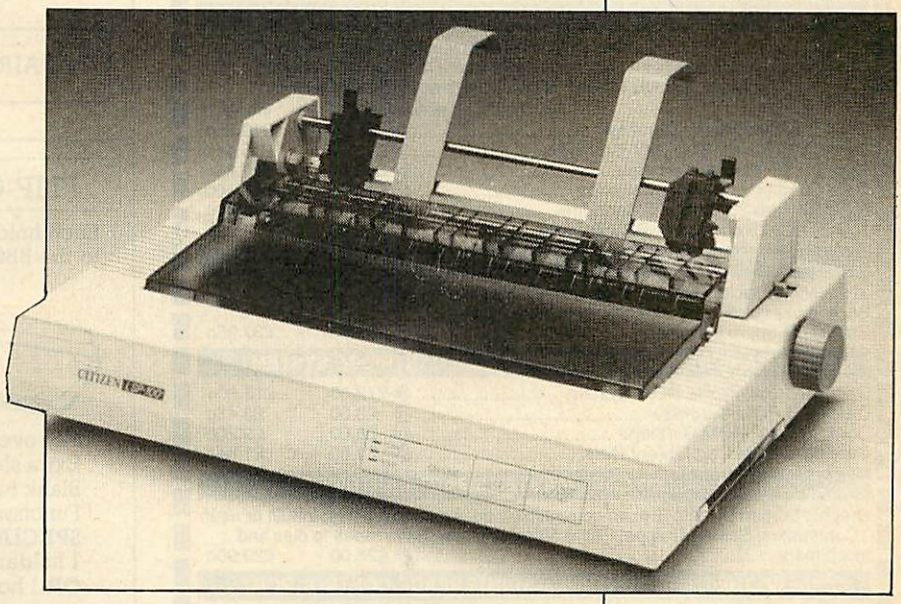
B B+ M

Another solid Citizen

Neil Fawcett examines the new LSP-100 Epson-compatible printer



THE LSP-100 bi-directional dot matrix printer is Citizen's latest addition to an already impressive range of products. As with most printers, you have the option of friction or tractor feed and this can be selected easily by moving a lever on the top right of the casing.

You also have the option to load paper from underneath the printer using a process called bottom-feeding (see the figure alongside). Loading paper this way can only be done when your printer is mounted on a stand. The tractor-feed mechanism must be attached to the printer and you must use continuous stationery. Loading paper is just like setting the tractor-feed up, except the paper comes from underneath.

On the front right side of the printer are three buttons controlling the online status, form feed and line feed. The printer must be brought offline before the feed buttons will work – rather annoying, but this is the case with several printers. Next comes a panel with three small lights – power, paper out and ready.

The DIP switches are easy to access: You simply switch the printer off and remove a cartridge-style interface located on the right of the printer as you look at it. You can then alter the switches to suit your micro. Instructions on how to do so are very well documented in the manual.

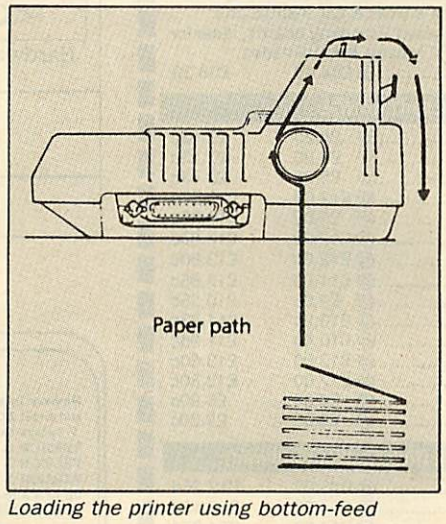
Now for the all-important question: Is it Epson-compatible? The answer is yes, and it is also switchable to IBM-compatible, not that this will affect BBC Micro owners.

Citizen says that the LSP-100 is an 80 column printer and the print head has nine pins which are used to give you a 9x9 matrix. When used in NLQ mode a double pass of the head allows the matrix to change to 17x17 and this gives you a wide variety of styles and typefaces.

The print speed is 150/175 characters per second (cps) at 10/12 cpi (characters per inch) in draft mode and 40 cps in NLQ mode. Now that is quite a mouthful, but it gives you an idea of the capabilities of this machine.

It is interesting to note that although this is quite a fast printer it is also very quiet. Even when doing a screen dump I could still manage to concentrate on other work.

There is a built-in 4k buffer – very useful indeed, as it allows you to continue working on your micro as the printer does its work. However, there is a snag with the large buffer – there isn't a flush button. So, if you make a mistake you have to wait until that large 4k buffer empties. Alternatively you can turn the printer off.



Loading the printer using bottom-feed

Fitting the cartridge type ribbon poses no problems. It's claimed to last for two million characters – but I didn't have time to test this.

The LSP-100 has a sleek modern look and is surprisingly compact when you consider that it does some tasks that printers twice its price can't.

The manual is well presented and easy to read with plenty of diagrams showing things like fitting the ribbon and so on.

This is a superb printer, well priced and should satisfy the needs of most homes and small businessmen.

Product: Citizen LSP-100 printer
Price: £249 excluding VAT
Supplier: Citizen Europe Ltd, Wellington House, 4-10 Cowley Road, Uxbridge, Middlesex, UB8 2XW
Tel: 0895 72621

Specifications

- 150/175 cps at 10/12 cpi in draft and 40 cps in NLQ
- Epson and IBM compatibility
- Parallel interface standard
- Tractor feed and friction feed
- 4k buffer
- 8 bit graphics capabilities
- Downloadable characters
- More than 400 print styles
- Automatic sheetfeeder available
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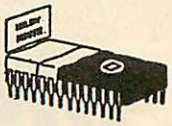

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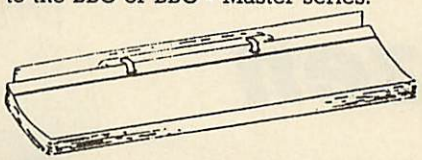

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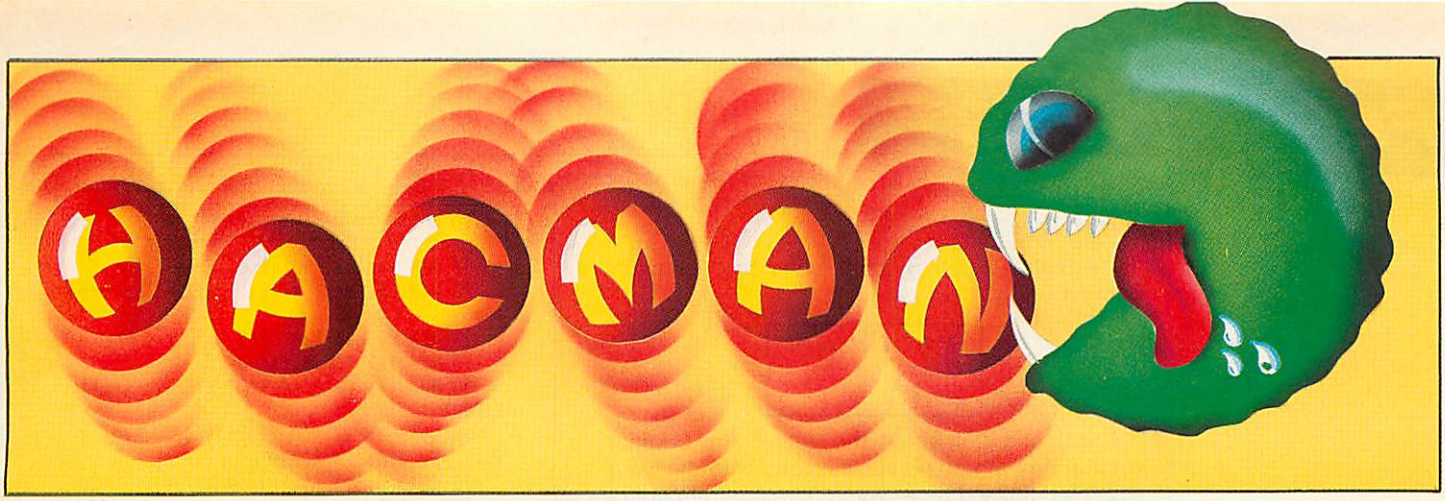

B B+ M

Dipping into a mixed bag

Hac Man updates some much-loved pokes that will keep Sam playing

FEATURING:
Play it again Sam
Stryker's Run
Mineshaft
Starquake
Dunjunz
Thrust
Elite
Zarch

PLAY It Again Sam seems to have sold amazingly well, judging from the number of letters I have received. However, almost all say the same thing: Last year's Thrust and Stryker's Run pokes do not work with the new versions. The reason is simple. Although the quartet appears identical to its stand-alone counterparts, the loading routines have been modified slightly.

To meet the demand I have written routines for them equivalent to the ones for the same games for the Compact featured in last month's column. Listings I and II provide infinite lives and fuel on the tape and disc compilation versions of Thrust, while Listings III and IV offer extra or infinite lives for the 32k and 128k compilation versions of Stryker's Run on 5.25in disc.

On the subject of past hints and tips, it's encouraging to see many of you taking advantage of the back issues department. While I try to help wherever and whenever I can, I do not have the space to repeat subjects covered in previous columns when there is always such an amazing flow of new material to cover.

Now excuse me for a moment while I extract my foot from my mouth. In last month's column I gave a list of Superior's Master Compact games that do and don't run with a Master 128 and 3.5in disc drive.

I mentioned a number with protection by Rob Northen that *didn't* work. Actually they do, but only in drive 0. I tried them on a dual-format system with a 3.5in drive 1 and a 5.25in drive 0. I'm sure they could be persuaded to work on a 3.5in drive 1, so if anyone wants to use Compact games on this rather unusual combination, would they please let me know.

One point I think I can make without fear of contradiction is that these *incompatible* games will not work on a BBC B or B+ with a 3.5in drive and ADFS. The reason is that the protection systems access the 1770 hardware directly, and the disc hardware on the Master 128 and Compact is located in a different area of memory. However, all Superior's more recent Compact offerings – mastered by Chris Hart – use legal techniques, so they certainly should work.

While I'm on the subject of glitches in last month's column, I featured a routine to obtain extra/infinite lives on the standard version of **Stryker's Run** from the Compact version of Play It Again Sam. Line 80 in Listing 2 sets the number of lives to the value of *L%*, but there wasn't a line to set *L%* anywhere in the program. Simply add the line:

```
45 L%=9
```

or however many lives you may want up to 127.

Listing I: Thrust infinite lives/fuel

```
   10 REM Thrust infinite lives/fuel
   20 REM BBC tape Play It Again Sam ver
sion
   30 REM by Hac-Man 1988
   40 REM (C) The Micro User
   50 MODE 7:FOR I%=0 TO 2 STEP 2:P%=&12
0:[OPT I%
   60 LDA# call2 MOD 256:STA &202:LDA# c
all2 DIV 256:STA &203
   70 JSR &900:LDA# 0:STA &56EB:JSR &572
0
   80 .call2 LDX# &FF:TXS:LDA# 0:STA &56
85:LDA# &60:STA &56C7:JSR &5633
   90 LDA# 0:STA &1971:STA &1981:\ infin
ite lives
  100 LDA# 0:STA &1A54:STA &1A56:\ infin
ite fuel
  110 JMP &3C80
  120 ]:NEXT:*FX 15,0
  130 PRINT"Please wind Sam tape to 'THR
UST3' and   hit a key...";:A%=GET
  140 PROCload:CALL &120
  150 END
  160
  170 DEFPROCload
  180 !&900=&208D22A9:!&904=&8D09A902
  190 !&908=&0EA90221:!&90C=&F42004A2
  200 !&910=&A018A2FF:!&914=&FFF74C09
  210 !&918=&48542E4C:!&91C=&54535552
  220 !&920=&48080D33:!&924=&4898488A
  230 !&928=&2903CAAD:!&92C=&03CA8DFE
  240 !&930=&AA68A868:!&934=&00602868
  250 ENDPROC
```

Digging deep

In my February column I featured a routine that converts Durell's **Mineshaft** to run on the Master. In the meantime, the game has been re-released by Alternative Software. Guess what – It still doesn't work on the Master without a little help.

Turn to Page 128 ▶

◀ *From Page 127*

As with the Durell original, load the Acornsoft Convert utility, then type:

```
!&C000=0:!&C004=0
*TAPE
CHAIN""
```

One last point about the game: The original version had a blue plastic cassette with the word *Durell* embossed on it. The loader program prints a message that any copy of the game that does not have this special cassette is a forgery, which should be returned to Durell immediately, with the possibility of a £100 reward. The first issue of the Alternative version just had a normal cassette, but it still featured this message. Sorry everyone, no rewards – they are genuine. Alternative has since remastered the game, so this message no longer appears.

'...and there's the possibility of a £100 reward'

Down the Dungeons

Andrew Asker of Carlton, Notts, has written in with a few tips that will be useful to the many arcade players stuck in the **Dunjunz**. He reports that the cassette inlay confuses the descriptions of the Wizard and Ranger. The first paragraph describes the Ranger and the second describes the Wizard, not the other way around, as stated. The third paragraph should be ignored.

Also contrary to the inlay, the cross of resurrection does not increase the armour rating. It is worth 10 points and will revive the first player killed, if any, giving him 32 health points.

Andrew would also like to know if there is a way of skipping levels. I don't know of any, but the following tip from P. Hamer of Walsall may help. It is a very useful routine for the disc version of Dunjunz that allows maps of the 25 levels to be saved to disc or copied to a printer. If, for

Turn to Page 130 ▶

EUREKA – A CHEAT

R. Johnson of Guildford, Surrey, has written in with news that Zarch has a cheat mode. With it you can increase your number of lives at will, re-fuel in mid-air and activate an automatic pilot.

Load Zarch as normal. When the game starts, stay on the pad and fire to make sure that the sound is on – if it isn't press S to switch it on. Now place one finger above Q, T and U. Press Q and then quickly press T and U together.

To see if it has worked, press D to engage the automatic pilot. If it hasn't, switch the sound back on and try again – it will work eventually. Once the cheat mode is in operation press D to engage or disengage automatic pilot, L to increase your number of lives by one, and F to re-fuel. Any or all of these features can be used at any time.

Mr Johnson's own high score on Zarch – without cheating – is 71,469 on level 7. Without using either this routine or Andy Smith's cheat from the December column, can anyone do better?

Many thanks to everyone who has written in with pokes and tips for ***Repton 2****, in response to my call for help in the February column. As usual I have run out of space, but I will be featuring them in next month's column. Until then, I'm going on Stryk!*

Listing II: Thrust infinite lives/fuel

```
   10 REM Thrust infinite lives/fuel
   20 REM BBC disc Play It Again Sam ver
sion
   30 REM by Hac-Man 1988
   40 REM (C) The Micro User
   50 MODE 7:FOR I%=0 TO 2 STEP 2:P%=&12
0:[OPT I%
   60 LDA# call2 MOD 256:STA &202:LDA# c
all2 DIV 256:STA &203
   70 LDA# 0:STA &56EB:JSR &5720
   80 .call2 LDX# &FF:TXS:LDA# 0:STA &56
85:LDA# &60:STA &56C7:JSR &5633
   90 LDA# 0:STA &1971:STA &1981:\ infin
ite lives
  100 LDA# 0:STA &1A54:STA &1A56:\ infin
ite fuel
  110 JMP &3C80
  120 ]:NEXT:*FX 15,0
  130 PRINT"Please insert Sam disc, side
 1, and hit a key...";:A%=GET
  140 *INIT
  150 *LOAD THRUST
  160 ?&A9B=1
  170 CALL&A00
```

Listing III: 32k Stryker's Run extra/infinite lives

```
   10 REM Stryker's Run extra/infinite l
ives
   20 REM BBC disc Play It Again Sam sta
ndard version
   30 REM by Hac-Man 1988
   40 REM (C) The Micro User
   50 L%=9:REM change to the required nu
mber of lives (1-127)
   60 MODE 7:FOR I%=0 TO 2 STEP 2:P%=&90
0:[OPT I%
   70 LDA# &A9:STA &2D93:STA &3132:LDA#
1:STA &2D94:STA &3133:\ infinite lives
   80 LDA# L%:STA &2965:\ no. of lives
   90 JMP &5EF6
  100 ]:NEXT:*FX 15,0
  110 PRINT"Please insert Sam disc, side
 2, and hit a key...";:A%=GET
  120 *INIT
  130 *LOAD SETSCR
  140 ?&2EC6=&60:CALL&2E71
  150 *LOAD GAME
  160 !&A9A=&ABA20900:CALL&A00
```

Listing IV: 128k Stryker's Run extra/infinite lives

```
   10 REM Stryker's Run extra/infinite l
ives
   20 REM BBC disc Play It Again Sam ext
ended version
   30 REM by Hac-Man 1988
   40 REM (C) The Micro User
   50 L%=9:REM change to the required nu
mber of lives (1-127)
   60 FOR I%=0 TO 2 STEP 2:P%=&900:[OPT
I%
   70 JSR &A00:LDA# &60:STA &A99:JSR &A0
0
   80 LDA# &A9:STA &30DF:STA &3420:LDA#
1:STA &30E0:STA &3421:\ infinite lives
   90 LDA# L%:STA &2C1B:\ no. of lives
  100 JMP &51E0
  110 ]:NEXT:*FX 15,0
  120 PRINT"Please insert Sam disc, side
 2, and hit a key...";:A%=GET
  130 *INIT
  140 *LOAD SRRUN
  150 !&A6C=&202E4F4C:CALL &900
```

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◀ *From Page 128*

example, you want to make a screen-dump of Level 14, enter the following lines:

```
*EDITOR
E
D
Ø
```

Master owners should turn the disc over at this point, because the 25 predefined screens are stored on the second side of the disc. Now enter, for example: LEVEL14 at the filename prompt. The map of this level will then be displayed on the screen. Press Control+Break, insert your own disc and type:

```
*SAVE MAP14 3000+5000
```

The map is now stored on your own disc, complete with a set of lines joining the keys and doors, showing which key opens which door. To dump this map to a printer, type in and run a program like the following:

```
10 MODE 2
20 *LOAD MAP14
30 *GPRINT
```

Line 30 should be changed to the command for whichever screen dump routine you have. While we're on the subject of Dunjunz, has anyone converted Ian Robertson's joystick routine, published in last October's column, to run with the disc version of the game?

Star Transporter

Matthew Taylor of Newbury, Berks, has noticed two omissions from the list of **Starquake** transporter codes printed in the January column. The two culprits are OKRIP and OTRUN. He also points out that one of the vital objects is an access card. It often appears in the starting location so, for a slightly unfair advantage, keep quitting and restarting until you see it.

If you don't have a copy of Starquake you can take advantage of *The Micro User* offer on Page 131.

Elitist

Peter Etherington of Thurnscoe, South Yorks, would like some help with **Elite**: He can't even dock. As I've mentioned before, the January and February 1986 issues of *The Micro User* featured a couple of pull-outs full of hints and tips and a program to edit the status of your commander.

But you're better off not using it because it only spoils the fun. And no, there's no way to make docking easier – the only way is lots of practice. Docking is, after all, probably the most essential skill that a new pilot needs to acquire in the quest to become a member of the Elite.

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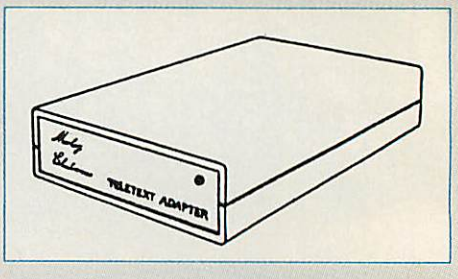
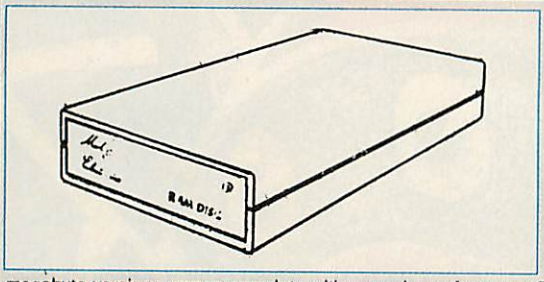
* Advanced design uses the latest technology, will handle ANY future enhancements to the Teletext system e.g.: full field; 8 bit data transfer; 2k pages etc.
* Simply plugs into the user port.
* Low power consumption, less than 200ma. Optional power supply available.
* User friendly menu driven software including extended OSCLI and OSWord commands for access from BASIC programs.
* Supplied with 16k ATS (Advanced Teletext Software) and 16k support ROM software inc. printer dumps, page spoolers etc.
* FREE Telesoftware, no access charges (updated weekly).
* Save selected pages to disc/tape for later retrieval.
* Full access to all Teletext services and channels e.g.: CEEFAX, ORACLE, 4-TEL.
* Gives you a real-time clock at your disposal (*TIME).
* Software upgrades to allow for any enhancements to the Teletext service, e.g.: extra channels, full field data on cable & satellite systems etc. (only the media charge).
* Easy to follow comprehensive user guides.
* No hardware limitations, it can for example receive virtually unlimited numbers of channels.
* Utils disc available including printer drivers allows pages to be selected and dumped direct to a printer



(no more TV or Radio Times to buy).

WHAT THE REVIEWERS SAID:
". . .In terms of price, performance, future expansion possibilities and those little touches that show thought for the end user I would recommend the Morley unit."–*(Acorn User, January, 1986).*
". . .The Morley unit has been designed to ensure that its operation is simple and smooth. It is the ideal Teletext adapter for school use."–*(A&B Computing, June, 1986).*
". . .Using it over a number of months in different schools, it has proved utterly reliable, and may confidently be recommended."–*(The Times Educational Supplement, September, 1986).*
THIS IS THE BIGGEST SELLING TELETEXT ADAPTER CURRENTLY IN PRODUCTION WORLDWIDE, AND COMES WITH A FULL MONEY BACK SATISFACTION GUARANTEE.

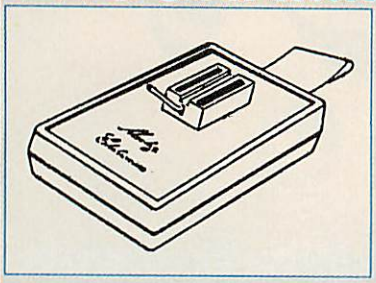
RAMDISC



Now available! The first true MEGA capacity RAMdisc for the BBC, BBC B+ and MASTER computers. This fully compatible unit, currently available in either 1 or 2 megabyte versions comes complete with operating software on ROM, power supply, and a comprehensive user guide.

FEATURES:
One megabyte of RAM connected to the 1mHz bus. Used with the supplied ROM software programs and files may be saved and loaded from the RAMdisc in the same manner as from a floppy disc with a large increase of speed, for example, a 20k mode 0 screen takes about 3-4 seconds to load from disc and about 0.2-0.3 seconds to load from the RAMdisc. The RAMdisc ROM operates as a utility ROM working with the current filing system rather than as a separate filing system. Therefore ensures compatibility with any Acorn compatible DFS (not ADFS). The RAMdisc can be selected by a * command to take the place of any drive number from 0 to 9. If the RAMdisc replaces a floppy drive as 0 for example, all commands addressed to drive 0 will be intercepted by the RAMdisc. The default drive number is 4. Any 'Dangerous' *commands such as *COMPACT, *COPY, *BACKUP etc can be intercepted and the BBC's RAM from page 2 to &7FFF saved to RAMdisc workspace, and may be recovered using a *command. This prevents accidental corruption of any programs/data in RAM you may have been using at the time. The filing system wedge ROM supplied supports load/save, byte file access, all relevant OSFSC commands, and contains a formatter verifier and 'sector' editor for use with the RAMdisc. Catalogue structure allows up to 2,688 files.
Well that's the spec., add to this our usual 12 month no quibble guarantee and we're sure you'll agree the Morley RAMdisc is the sensible alternative if increased storage capacity and speed is your requirement.

EPROM PROGRAMMER V2



The MORLEY EPROM PROGRAMMER V2 is a small self contained unit that plugs into the BBC or MASTER user port. It comes with a high quality ZIF (zero insertion force socket) and contrasting plastic case. Also included in the package is it's own user friendly menu driven software on ROM or disc.
This state of the art unit, allows programming of 2764 (8k), 27128 (16k), and 27256 (32k) EPROMS. Not only does the hardware allow programming of the usual NMOS devices, but will handle the new generation CMOS equally as well, and with the average time taken to program a 16k at less than 30 seconds we believe it to be one of the fastest programmers available today.

THE HARDWARE
The Unit is completely under software control, there are no knobs or switches to baffle the novice, and the extended features provided should excite the pro's.

THE SOFTWARE
The comprehensive user friendly software included in the package has two main parts, the first allows EPROMS to be read, programmed, verified and edited, also allowing a ROM image to be loaded or saved to disc. The second is a full ROM management system in its own right, which has a host of useful features and routines, such as KILL and RESURRECT ROM to disable or enable a sideways ROM, dump ROM image to buffer or disc, move ROM image in buffer to sideways RAM, and VIEW-SEARCH any sideways ROM.
The whole system is available now for less than the price of one WORDWISE chip. So get yourself the all new MORLEY EPROM PROGRAMMER V2 today and start using those expansion boards for what they were made for! ROMS.
Immediate delivery no quibble 12 month guarantee.

MASTER CARTRIDGE

Designed and manufactured by Care Electronics to Acorn specifications.
These high quality Master expansion cartridges will take two 16k sideways ROM's, and will, unlike similar cartridges available from other manufacturers, accept the new second generation programs, such as Computer Concepts Interword and Spellmaster ROM's.
These Cartridges come in a high quality, robust, formed-plastic case, that fits neatly into either one of the Master's cartridge slots.
QUADS–also available quad cartridges, specifications as Duels but 4x16k ROM's.

MASTER SMART CARTRIDGE

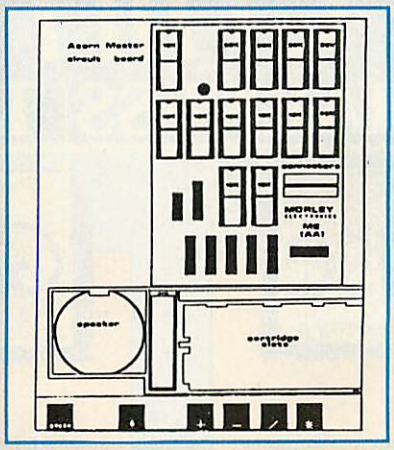
This device was designed and manufactured jointly by Morley and Care Electronics.
The **Smart** cartridge will at the press of a button halt any program running in memory and execute any one of a host of useful built in, or user defined procedures, and once completed will return to the program and continue where it left off. The only limiting factor with this device is the programmers imagination.
The **Smart** cartridge will prove useful to the novice, allowing him to do the simple things like dump any screen to printer, and make backups of protected tape or disc based software, but has an open ended specification for the advanced 'HACKER' allowing advanced programming techniques to be incorporated into almost any program at the touch of a button.

BUILT IN FEATURES (at the press of a button)
Autosaves computer's entire memory.
Freeze program at any point.
Screen dump (any mode) to printer or disc.
Allows any OSCLI command without disturbing memory.
Copies 90% of protected software.
Tape to disc, disc to tape.
User friendly menu.
Sound On/Off.

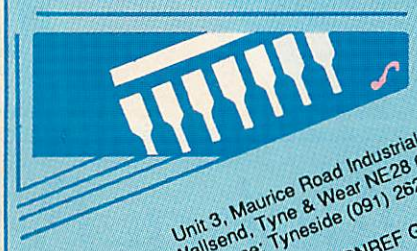
ALL CARTRIDGES COME WITH A 12 MONTH NO QUIBBLE WARRANTY

NEW PRODUCT

MORLEY MASTER BOARD 'AA'



MORLEY ELECTRONICS



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Telex: 265871 A/B MONREF G (Quoting Mag 70211)

At long last the add-on all MASTER users have been waiting for, an internal ROM board.

No more need to turn the computer off to insert the cartridge containing the ROM you need to debug the program in memory.

The new **MORLEY MASTER BOARD "AA"** allows you to have up to 8x16k and 4x32k extra Roms installed inside your MASTER and still leaves the cartridge slots free. This in effect allows your MASTER to support as many as 24, 16k ROMs installed permanently, whilst retaining the standard 4 x sideways ram banks and four banks by using cartridges

A staggering 32 ROM images installed and accessible at any time

Included in the package is a utility ROM which has many useful features such as 'FICOPY', a clever file transfer program that transfers files between DFS and ADFS formats or vice versa.

So for less than the price of four external cartridges you get a MASTER BOARD "AA" which with twice the capacity has got to be **THE** ROM expansion for the serious MASTER user.

The unit comes with the usual Morley, full no-quibble twelve months warranty, and our usual after sales service

THE COMPLETE RANGE OF TELETEXT SOFTWARE from M/B SOFTWARE

***NEW . . . DESIGN 7 PLUS** – now 'the best' is even better. Held in high regard by reviewers and hundreds of satisfied owners, DESIGN 7 has been further improved, with revised keystrip & even more features. Design/load/save and MODE 7 screen with ease, up to full CEEFAX/Oracle standard. Will convert ANY MODE 7 screen to a BASIC procedure, for inclusion in your own programs. ROM version includes a file copier, printer dumps useable from BASIC etc. B/MASTER/COMPACT.

TELETEXT EMULATORS/SCREEN DISPLAYS/INFORMATION SYSTEMS – A complete range of teletext programs to cater for all needs, with full teletext adapter interfacing.

***NEW . . . DESFAX** – totally new version – streets ahead of the competition – run your own information/display system. Stores hundreds of screens on dual 80 track drives (96 screens on single-sided 40 track), with access to any screen with a SINGLE KEYPRESS. Lots of special effects – screens can scroll, slide, overwrite etc. Animation, loops, subroutines – send for details – not enough space here to even begin to describe the advanced features!! B/MASTER/COMPACT

***NEW . . . MASTERFAX** – 84 MODE 7 screens in memory at once. 148 screens possible with cartridge RAM. An advanced teletext/carousel program featuring SINGLE KEYPRESS or 3-digit page selection. Runs entirely from memory – no disc accesses after pages are loaded. Superb animation and other effects. MASTER/COMPACT only.

***NEW . . . VU-FAX** – 1000 screens and no disc accesses! Screens stored on MORLEY 1MByte RAM DISC. SINGLE KEYPRESS gives instant access to any screen (or emulate teletext). This is the ultimate MODE 7 screen management system – there is nothing else like it. MODEL B/MASTER 128.

***ALSO . . . MASTERcopy** – DFS/DFS, DFS/ADFS, ADFS/DFS, ADFS/ADFS file copier. Uses the MASTER 128's memory to the full to permit fast disc copying. 31 DFS files to ADFS disc in less than 2 minutes. Creates directories automatically. You will wonder how you ever managed without this program. Described by reviewers as 'unexcelled'. MASTER 128 and COMPACT's fitted with DFS ROMS.

ORDER FORM

To order simply complete and return by post enclosing your cheque/P.O. made payable to Morley Electronics, or by phone during office hours, quoting your ACCESS or VISA number.

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HARNESS THE POWER

Alpha-Base

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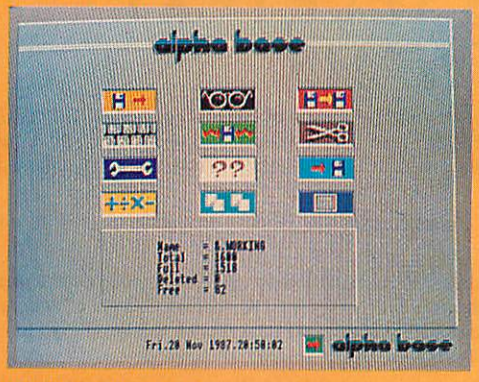
Alpha-Base is the successor to **Beta-Base**, the top selling database for the BBC micro. Alpha-Base really does **'HARNESS THE POWER'** of the Archimedes. As with all Clares products we have made **Alpha-Base** powerful but easy to use. You can be using a database within 5 minutes of receiving the program - that's easy. But don't be fooled, you do not lose any functions or power. Here are just some of the functions:



* WIMP based using icons and mouse
* Hard disc compatible - massive files
* Free format screens with on line editing of field order
* Upto 400 fields & 27600 chars per record
* Upto 2.14 billion records per file !!!
* Multiple display, entry and printer forms can be used with each file
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* Validation on each field if required
* Transfer fields from one file to another
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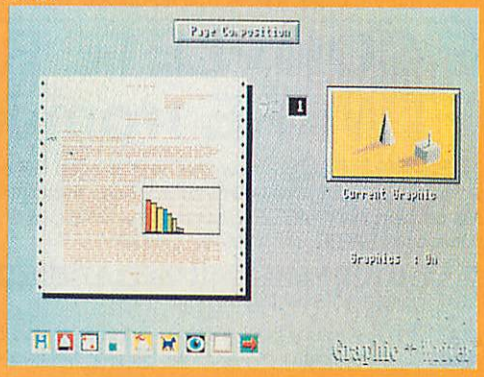
* Data stored on disc so computer failure will not result in loss of the data

If you want a powerful database that you can boot up and run within 5 minutes then buy **Alpha-Base** now. Absolutely no programming skills required.

Graphic Writer

£29.95

Graphic Writer, formerly Image Writer, is a sophisticated WIMP based word processor with an inbuilt graphics editor. It can be used as a standard word processor or graphics can be included to provide diagrams, graphs etc within your document. Graphics can even be imported from **ARTISAN**



* Totally icon driven from menus
* Multiple documents in memory, upto 512k
* Super smooth scrolling
* Fast search & replace
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* Text styles give plain, bold, italic, underlined, subscript, superscript or combinations of these eg bold italic underlined subscript.
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* Page Composition allows placing of graphics, mini preview etc
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To create a document with **Graphic Writer** you type in your text, using the many text styles available, leave room for the graphics and then place the graphics using Page Composition. It's simple and easy to use. You can have up to 14 documents in memory on a 310, that's equivalent to about 220 pages of A4 text.

See what the magazines say:

> the scrollling is unbelievably smooth... I can highly recommend this excellent product as being **THE** word processor for the Archimedes
>
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> excellent value... bowled over by its stunning use of graphics.
>
> *RISC USER December 1987*

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DON'T FORGET, YOU CAN ORDER WITH ACCESS CARD TOO!

Listing I: Main screen generation program

```
  10 REM Power Map
  20 REM by Norman Parr
  30 REM (c) The Micro User
  40 MODE1:VDU19,2,6;0;
  50 VDU23,224,0,0,0,0,0,0,24,60,126
  60 VDU23,225,0,0,0,0,0,60,60,60,60
  70 VDU23,226,0,0,0,0,36,24,24,36,36
  80 VDU23,227,0,0,0,0,15,6,6,6,15
  90 VDU23,228,0,0,0,0,14,9,14,10,9
 100 VDU23,229,0,0,0,0,14,8,4,2,14
 110 VDU23,230,0,0,0,0,9,9,15,9,9
 120 VDU23,231,0,0,0,0,15,8,15,8,15
 130 VDU23,232,0,0,0,0,6,9,15,9,9
 140 VDU23,233,0,0,0,0,25,25,21,19,19
 150 VDU23,234,4,14,21,4,4,4,4,4
 160 VDU23,235,0,0,0,0,7,8,8,8,7
 170 VDU23,236,0,0,0,0,14,17,17,17,14
 180 VDU23,237,0,0,0,0,8,8,8,8,15
 190 VDU23,238,0,0,0,0,14,9,14,8,8
 200 VDU23,239,0,0,0,0,9,10,12,10,9
 210 VDU23,240,0,0,0,0,17,10,4,4,4
 220 VDU23,241,0,0,0,0,9,9,9,9,15
 230 sea$=CHR$227+CHR$228+CHR$227+CHR$2
29+CHR$230+" "+CHR$229+CHR$231+CHR$232
 240 k$=CHR$239+CHR$231+CHR$240
 250 c$=CHR$235+CHR$236+CHR$232+CHR$237
 260 o$=CHR$236+CHR$227+CHR$237
 270 n$=CHR$233+CHR$241+CHR$235+CHR$237
+CHR$231+CHR$232+CHR$228
 280 h$=CHR$230+CHR$231+CHR$238
 290 GCOL0,0:VDU24,50;390;600;1006;:GCO
L0,131:CLG
 300 REM Map Co-ords
 310 FOR I%=1 TO 119:READ X%,Y%
 320 IF I%<>1 IF I%<>96 IF I%<>105 X%=X
%*5:Y%=Y%*5
 330 IF I%<>1 IF I%<>96 IF I%<>105 PLOT
1,X%,Y% ELSE MOVE X%,Y%
 340 NEXT:VDU26
 350 REM Station Locations
 360 GCOL 0,1:VDU 5
 370 FOR J%=1 TO 17:READ X%,Y%
 380 X%=(X%*5)+70:Y%=(Y%*5)+385
 390 MOVE X%,Y%
 400 IF J%<9 VDU224:ELSEIF J%<15 VDU225
:ELSE VDU226
 410 NEXT:GCOL 0,0
 420 MOVE 60,750:PRINTsea$
 430 MOVE 550,1000:VDU233
 440 MOVE 550,965:VDU234
 450 MOVE 410,560:PRINTk$
 460 MOVE 370,530:PRINTc$
 470 MOVE 370,500:PRINTo$
 480 MOVE 370,470:PRINTh$
 490 MOVE 370,440:PRINTn$
 500 GCOL 0,1
 510 MOVE 350,525:VDU224
 520 MOVE 350,470:VDU225
 530 MOVE 350,440:VDU226
 540 MOVE340,390:DRAW340,560:DRAW600,56
0
 550 REM Frame
 560 GCOL0,2
 570 FOR K%=1 TO 50:READ X%,Y%
 580 IF X%<0 PLOT85,ABSX%,Y% ELSE MOVEX
%,Y%
 590 NEXT:VDU4,26
 600 VDU28,1,30,38,21:COLOUR129:CLS
 610 VDU24,654;390;1245;1006;:GCOL0,131
:CLG
 620 VDU26:GCOL 0,0
 630 FOR K%=1 TO 28:READ X%,Y%
 640 IF X%<0 MOVE ABSX%,Y% ELSE DRAW X%
,Y%
 650 NEXT
 660 REM Control Areas
 670 FOR J%=1 TO 6
 680 GCOL 0,3:READ x,y,xx,yy
 690 PROCrect(x,y,xx,yy)
 700 GCOL0,0
 710 PROCrect(x+20,y-20,xx-20,yy+20)
 720 NEXT:VDU5
 730 GCOL0,3:MOVE125,330:PRINT"Supply"
 740 MOVE125,75:PRINT"Demand"
 750 MOVE550,330:PRINT"Station"
 760 MOVE990,330:PRINT"Status"
 770 MOVE570,75:PRINT"Details"
 780 MOVE1025,75:PRINT"Time"
 790 *SAVE"MapScrn" 3000 8000
 800 MODE7:END
 810 DEFPROCrect(X%,Y%,x%,y%)
 820 PLOT4,X%,Y%:PLOT4,x%,Y%
 830 PLOT85,X%,y%:PLOT85,x%,y%:ENDPROC
 840 REM Map Data
 850 DATA 100,1010,2,-2,4,-4,-2,-2,-4,4
 860 DATA -2,-1,4,-7,2,-2,0,-4,3,0,1,3
 870 DATA -2,5,3,3,9,-8,4,3,-4,2,-1,4
 880 DATA 2,1,3,-4,2,-1,1,-2,1,2,2,-1
 890 DATA 1,-2,3,1,5,4,4,0,-1,4,3,1
 900 DATA 5,-1,7,0,0,-2,-5,0,-2,0
 910 DATA 3,-1,-4,-2,-2,-6,-4,-6,-1,-6
 920 DATA 4,-1,1,-5,2,-4,1,3,2,-1,-1,-7
 930 DATA 2,-1,1,5,2,0,1,3,4,-1,0,-3
 940 DATA -2,-1,1,-2,-2,-1,1,-3,-4,-2
 950 DATA -1,1,0,-8,6,-1,0,-1,-5,-4
 960 DATA 0,-7,2,-4,5,-1,-2,-2,-4,1
 970 DATA -4,5,-3,-3,3,-5,-6,4,-5,-2
 980 DATA -6,0,-6,-2,-3,-1,-5,-4,-2,-5
 990 DATA -9,-7,-2,-3,3,0,1,2,3,-2,1,1
1000 DATA 0,2,5,2,6,-1,-1,-2,0,-5,3,1
1010 DATA -2,-4,-2,-5,4,0,-3,-5,0,-3
1020 DATA -6,-6,-6,-3
1030 DATA 160,785,2,7,7,7,2
1040 DATA -1,-1,-2,3,-1
1050 DATA -5,-7,-5,-3,-3,0
1060 DATA 190,676,2,2,5,0,0
1070 DATA -2,3,-4,2,1
1080 DATA 1,-2,-8,-6,-1,1,0
1090 DATA 1,-2,0,0,2,-2,1,0,3,0,3
1100 REM Stations
1110 DATA 80,62,68,60,77,60,70,57
1120 DATA 80,76,54,88,73,63
1130 DATA 66,53,34,39,32,47,32,43
1140 DATA 36,51,33,35,37,10,35,33,24,62
1150 DATA 61,83
1160 REM Frame
1170 DATA 30,350,5,370,-1275,370
1180 DATA 1250,354,-30,350
1190 DATA 1275,370,1275,35,-1250,35
1200 DATA 1250,354,-1275,370
1210 DATA 30,35,5,35,-5,370
1220 DATA 30,350,-30,35
1230 DATA 50,385,30,397,-30,1022
1240 DATA 50,1010,-50,385
1250 DATA 50,1010,30,1022,-620,1022
1260 DATA 600,1010,-50,1010
1270 DATA 620,1022,600,1010,-620,397
1280 DATA 600,385,-600,1010
1290 DATA 650,385,650,1010,-630,1022
1300 DATA 630,397,-650,385
```

Turn to Page 136 ▶

Get it right!

```
 10 =    0 0 | 270 = 6FBE 0 | 530 = 356C 2 | 790 = B50D 3 | 1050 = F63A A | 1310 = 6395 D
 20 =    0 0 | 280 = 2289 7 | 540 = 92EC F | 800 = CDB0 6 | 1060 = 7594 D | 1320 = DDE9 D
 30 =    0 0 | 290 = 330A 2 | 550 =    0 F | 810 = 3493 C | 1070 = 8343 B | 1330 = 2B9D F
 40 = FF39 9 | 300 =    0 2 | 560 = 334C 4 | 820 = BA7B D | 1080 = 7355 F | 1340 =  D97 4
 50 = 5372 E | 310 = 945F B | 570 = BB27 0 | 830 = FE1B 1 | 1090 = 5EDD 3 | 1350 = 245A B
 60 = 6601 5 | 320 = F456 E | 580 = 9404 7 | 840 =    0 1 | 1100 =    0 3 | 1360 = 9B2C 9
 70 = E4D5 1 | 330 = 192B 5 | 590 = 254F 4 | 850 = A6E2 6 | 1110 = C903 6 | 1370 =    0 9
 80 = 36A0 1 | 340 = E756 C | 600 = 1114 D | 860 = CDED 9 | 1120 =  6C8 B | 1380 = FA4F 5
 90 = C4DE 5 | 350 =    0 C | 610 = B2C6 8 | 870 = 1A58 A | 1130 = 7BD6 6 | 1390 = F895 2
100 = E25A 4 | 360 =  FFC 7 | 620 = 3625 8 | 880 = AB80 F | 1140 = 58E7 5 | 1400 = 2C75 6
110 = CC92 3 | 370 = B75B 9 | 630 = 8E22 A | 890 = 39EF 0 | 1150 = C490 7 | 1410 =  DE2 1
120 = 9E3E 5 | 380 = C9E8 1 | 640 =  C01 0 | 900 = 3D22 A | 1160 =    0 7 | 1420 = EB3D A
130 = 6A60 3 | 390 = D0D3 C | 650 = 2C83 2 | 910 = 8101 9 | 1170 = 462F 4 | 1430 = C8A0 2
140 = EE81 2 | 400 = 6498 9 | 660 =    0 2 | 920 = 7C6A A | 1180 = B594 E | 1440 = 5284 7
150 = 2BC8 5 | 410 = 2ADD D | 670 = 3EFE A | 930 = FB7F 7 | 1190 = 3009 3 | 1450 = 41E7 9
160 = FE59 6 | 420 = 7252 7 | 680 =  4B5 C | 940 = 2136 1 | 1200 = C2F2 6 | 1460 = 4167 A
170 = 500F D | 430 =  7CB A | 690 = 20FD 4 | 950 = 9986 F | 1210 = 953A F | 1470 =    0 A
180 = 3D73 7 | 440 = 58A7 A | 700 = 130E F | 960 = A302 D | 1220 = 7041 4 | 1480 = 965C 5
190 = 99AE A | 450 = FDF3 8 | 710 = 692E 8 | 970 = 743A E | 1230 = EE18 0 | 1490 = EF2E C
200 = 9B10 8 | 460 = 6D59 2 | 720 = D972 2 | 980 = 3417 E | 1240 = 99EB 6 | 1500 = B766 D
210 = ABA6 6 | 470 = E6D4 2 | 730 = 450A 6 | 990 =  8A2 D | 1250 = F99C 2 | 1510 = 92A0 1
220 = 1C0A E | 480 =  F63 D | 740 = 9CF3 7 |1000 = C4E1 7 | 1260 = B2DC E | 1520 =  FBB A
230 = CDB6 3 | 490 = 6B25 7 | 750 = 9373 B |1010 = 1137 C | 1270 = 21BC D | 1530 = 31F4 A
240 = 71F7 5 | 500 = 619B B | 760 = 9C3A 0 |1020 = 987D 7 | 1280 = 7882 9
250 = 9C51 7 | 510 = B0D9 7 | 770 = 7C41 A |1030 = BA02 B | 1290 = CDCA E
260 = 65BC C | 520 = DD8D 5 | 780 = 1952 4 |1040 =  15E 8 | 1300 = FFEA C
```

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```
 1310 DATA 650,1010,630,1022,-1262,1022
 1320 DATA 1250,1010,-650,1010
 1330 DATA 1250,1010,1262,1022,-1262,397
 1340 DATA 1250,385,-1250,1010
 1350 DATA 5,35,1275,35,-1275,10
 1360 DATA 5,10,-5,35
 1370 REM Edges
 1380 DATA -5,5,30,35,1250,35
 1390 DATA 1250,350,30,350,30,35
 1400 DATA -1250,35,1275,5,-1250,350,127
5,370
 1410 DATA -30,350,5,370,-30,1022,50,101
0
 1420 DATA 600,1010,600,385,50,385,50,10
10
 1430 DATA -600,1010,620,1022
 1440 DATA -630,1022,650,1010,1250,1010,
1250,385
 1450 DATA 650,385,650,1010
 1460 DATA -1250,1010,1270,1030
 1470 REM Controls
 1480 DATA 90,290,360,210
 1490 DATA 90,170,360,90
 1500 DATA 420,290,930,210
 1510 DATA 420,170,930,90
 1520 DATA 1000,290,1170,210
 1530 DATA 970,170,1200,90
>*XS
```

Listing II: Simulation title program

```
   10 REM POWER!
   20 REM by Norman Parr
   30 REM (c) The Micro User
   40 ON ERROR MODE7:PAGE=PP%:REPORT:PRI
NT" at ";ERL:END
   50 PP%=PAGE:MODE1
   60 VDU23,224,0,0,0,0,60,60,60,60,60,60
   70 VDU23,225,0,0,0,0,0,0,24,60,126
   80 VDU23;11,0;0;0;0;
   90 VDU28,4,31,35,0:COLOUR128
  100 VDU19,2,4;0;:COLOUR0
  110 perf$="-"+STRING$(26,"-")+"-"
  120 L$=" "+CHR$224+"|"+STRING$(26," ")
+"|"+CHR$224
  130 LL$="  |"+STRING$(26," ")+"|"
  140 COLOUR131:idx%=4:llx%=24
  150 S%=-1:L%=FALSE:PROCscroll(6)
  160 REPEAT:READ t$:PROCscroll(1)
  170 n$=LEFT$(t$,1):t$=MID$(t$,2)
  180 IF n$="<" PROCleft
  190 IF n$="=" PROCcentre
  200 IF n$=">" PROCright
  210 UNTIL n$="!":PROCscroll(1)
  220 REPEATUNTILGET=32
  230 VDU23,224,-1;-1;-1;-1;
  240 VDU23,225,0,0,0,0,0,0,24,60,126
  250 VDU23,226,0,0,0,0,60,60,60,60
  260 VDU23,227,0,0,0,36,24,24,36,36
  270 VDU19,2,6;0;:*LOAD "MapScrn"
  280 PAGE=&1200:CHAIN"Board"
  290 DEF PROCscroll(N%):LOCAL J%
  300 FOR J%=1 TO N%:VDU31,0,31,10,11
  310 S%=S%+1:COLOUR0:SOUND0,-7,7,1
  320 IF S%MOD16=0 PRINTSPC1perf$:J%=J%-
1:ELSEIF L% PRINTL$ ELSE PRINTLL$
  330 L%=NOTL%:NEXT:VDU11:ENDPROC
  340 DEF PROCleft:LOCAL X%:X%=idx%
  350 PROCout(X%,t$):ENDPROC
  360 DEF PROCout(X%,t$)
  370 LOCAL T%:FOR T%=1 TO LEN(t$)
  380 IFNOTINKEY-1PROCpause(10+RND(15))
  390 VDU31,X%+T%-1,VPOS
  400 COLOUR0:VDUASCMID$(t$,T%)
  410 COLOUR1:VDUASC"*":NEXT
  420 VDU127:ENDPROC
  430 DEF PROCpause(t):t=t+TIME
  440 REPEAT UNTIL TIME>t:ENDPROC
  450 DEF PROCcentre:LOCAL X%
  460 X%=idx%+(llx%-LENt$)/2
  470 PROCout(X%,t$):ENDPROC
  480 DEF PROCright
  490 LOCAL X%:X%=idx%+llx%-LENt$
  500 PROCout(X%,t$):ENDPROC
  510 DATA =POWER!,""
  520 DATA =by Norman Parr,""
  530 DATA <A simulation exercise
  540 DATA <based on operating the
  550 DATA <N.W. Area of the Central
  560 DATA <Electricity Generating
  570 DATA <Board for 24 hours.,""
  580 DATA =WEATHER FORECAST,""
  590 DATA <The high pressure will
  600 DATA <continue for several
  610 DATA <more days. Temperatures
  620 DATA <will remain below 0C and
  630 DATA <may reach -10C by dawn.,""
  640 DATA <Dense fog will persist
  650 DATA <in many lowland areas
  660 DATA <especially on the
  670 DATA <Lancashire Plain.,"","
  680 DATA <Press space...,"!"
```

Get it right!

```
  10 =    0 0    240 = 8684 D    470 = BA7F 6
  20 =    0 0    250 =  83A C    480 = 4540 9
  30 =    0 0    260 = 890D 3    490 = E7B1 5
  40 = 86E5 5    270 = F69C A    500 = BA7F 6
  50 = 54AF 1    280 = A0D0 9    510 = A7A8 2
  60 = 9FEE 8    290 = 6373 7    520 = 96E2 8
  70 = 8684 4    300 = E8AE 6    530 = 64EC 8
  80 = 5556 4    310 = 9CE5 6    540 = C5D9 2
  90 = B754 4    320 = 41AD 1    550 = FD98 6
 100 = EBF7 7    330 = F4C8 4    560 = CFB0 6
 110 = D71D 3    340 = 62AA 8    570 = 54A6 F
 120 =  DE6 8    350 = BA7F 8    580 = A6AC F
 130 = 9492 1    360 = 9818 E    590 =  19E E
 140 = B078 D    370 = D3ED F    600 = BF8F 1
 150 = B210 3    380 = C153 3    610 = A7E4 F
 160 = 943C 6    390 = 11D8 0    620 = 20B0 A
 170 = 7718 0    400 = 9404 C    630 = 7314 2
 180 = 4E57 F    410 = A1F6 1    640 = 742F 6
 190 = 796C 0    420 = 6E61 E    650 = A930 4
 200 = F390 5    430 = 7708 B    660 = ECD6 B
 210 = B0EF 0    440 = E9A6 2    670 = 7D67 8
 220 = 5B81 C    450 = D286 F    680 = 8E01 4
 230 = 7341 6    460 = F7D2 0
```

Listing III: Main simulation program

```
   10 REM Electricity Board
   20 REM by Norman Parr
   30 REM (c) The Micro User
   40 PROCreloc(&E00):VDU19,2,6;0;
   50 DIM De(25),mp(17),ap(17),t%(25)
   60 DIM s$(17),p1%(17),p2%(17),h$(8)
   70 FOR I%=1 TO 25:READ T%:t%(I%)=T%*1
00
   80 De(I%)=t%(I%)+100+RND(50):NEXT
   90 DATA 31,30,28,27,26,26,28,46,49,51
  100 DATA 49,50,48,47,48,55,62,60,55,50
  110 DATA 43,36,30,33,31
  120 FOR I%=1 TO 17:READ mp(I%):NEXT
  130 DATA 232,168,240,1880,112
  140 DATA 60,60,480,5,0,0,27,24,53
  150 DATA 390,840,660
  160 FOR I%=1 TO 17:READ ap(I%):NEXT
  170 DATA 170,70,80,1300,50,5,30,12,0,0
,0,0,0,0,268,600,400
  180 FOR I%=1 TO 17:READ s$(I%):NEXT
  190 DATA Agecroft,Bold,Carrington
  200 DATA Fiddlers Ferry,Padiham
  210 DATA Roosecote,Westwood,Ince
  220 DATA Cwm Dyli,Dinorwig(1725),Ffest
iniog(360)
  230 DATA Dolgarrog,Maentwrog,Rheidol
  240 DATA Trawsfynydd,Wylfa,Heysham
  250 FOR I%=1 TO 8:READ h$(I%):NEXT
  260 DATA f0 Station nos.,f1 Actual pow
er,f2 Maximum power,f3 Actual demand,f4
Typical demand,f5 Pump storage,f8 Help,f
9 Alter power
  270 FOR J%=1 TO 17:READ K%,L%
  280 p1%(J%)=K%*5+70:p2%(J%)=L%*5+385
  290 NEXT
  300 DATA 80,62,68,60,77,60,70,57
  310 DATA 80,76,54,88,73,63
  320 DATA 66,53,32,43,32,47,34,39
  330 DATA 36,51,33,35,37,10,35,33,24,62
  340 DATA 61,83
  350 p=0:DE=0:sts=100:pp=0:ppp=0
  360 shut=20:st=10:tol=150
  370 pw=0:pw1=0:w=0:cp=0:VDU5
  380 FOR hr=1 TO 24:VDU26:PROCtime
  390 GR=0:MOVE850,260:PRINTsts
  400 MOVE1,140:PRINTDe(hr):PROCsup
  410 IF hr>1 PROCpp ELSE PROChelp
  420 REPEAT:*FX15
  430 IFINKEY-33 PROCpn
  440 IFINKEY-114 PROCpp
  450 IFINKEY-115 PROCstamax
  460 IFINKEY-116 PROCactdem
  470 IFINKEY-21 PROCdemand
  480 IFINKEY-117 PROChep
  490 IFINKEY-119 PROChelp
  500 IFINKEY-120 PROCinp
  510 IF hr>17 AND hr<21 AND cp=0 p=RND(
10):IF p>5 VDU26:PROCsd
  520 C=0:GCOL0,3:IF hr=24 PROCquit:END
  530 UNTILINKEY-99:PROCclg:VDU26
  540 PROCcl(150,260,0,6,3):PROCsup
  550 IF SU+tol<De(hr+1) PROCgrid:A=INKE
Y300
  560 GR=0
  570 VDU26:PROCcl(150,140,0,6,3):MOVE1,
140:PRINTDe(hr+1)
  580 IF SU>De(hr+1)+tol sts=sts-INT(((S
U-(De(hr+1)+100))/100))-st
  590 IF SU>=De(hr+1) AND SU-tol<=De(hr+
1)sts=sts+st
  600 IF sts<0 sts=0
```

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```
  610 PROCcl(1025,260,0,4,3):MOVE850,260
:PRINTsts
  620 IFsts<=shut PROCclg:PROCt(700,900,
"SYSTEM SHUTDOWN"):FORF=1TO30:SOUND1,-15
,180,2:SOUND1,-15,50,2:NEXT:PROCt(800,80
0,"You are"):PROCt(800,700,"SACKED!"):EN
D
  630 VDU26
  640 mp(10)=mp(10)-ap(10):IF mp(10)<0 m
p(10)=0
  650 mp(11)=mp(11)-ap(11):IF mp(11)<0 m
p(11)=0
  660 pp=0:ppp=0:pw=0:pw1=0:w=0:cp=0
  670 X=0:ap(10)=0:ap(11)=0
  680 NEXT:END
  690 DEFPROCcl(M1,M2,c,no,c1)
  700 MOVE M1,M2:GCOL0,c
  710 FOR I%=1 TO no:VDU224:NEXT
  720 GCOL0,c1:ENDPROC
  730 DEFPROCinp:PROCce(3)
  740 IF C=10 OR C=11 PROCcl(450,140,0,1
4,3):PROCclg:PROCt(700,900,"PUMP STORAGE
"):PROCt(700,800,"USE CONTROL f5"):A=INK
EY300:PROCclg:PROCpp:ENDPROC
  750 PROCcl(450,260,0,14,3)
  760 MOVE450,260:PRINTs$(C)
  770 GCOL0,0:PROCmove
  780 PROCcl(450,140,0,14,3)
  790 PROCce(5):ap(C)=CC
  800 IFap(C)>mp(C)ap(C)=mp(C):sts=sts-s
t:PROCcl(1025,260,0,4,3):MOVE850,260:PRI
NTsts
  810 PROCcl(450,140,0,14,3)
  820 PROCcl(450,260,0,14,3)
  830 PROCcl(150,260,0,6,3)
  840 IF ap(C)<0 ap(C)=0
  850 GCOL0,1:PROCmove:PROCsup:PROCpp
  860 ENDPROC
  870 DEFPROCce(z)
  880 REPEAT PROCcl(450,140,0,14,3)
  890 MOVE450,140:IF z=3 PRINT"Station?"
 ELSE PRINT"Power?"
  900 C$="":FOR L=1 TO z
  910 MOVE750,140:PRINTC$:B=GET
  920 IF B=13 L=z
  930 IF B<>13 C$=C$+CHR$B
  940 NEXT
  950 IF z=3 C=VALC$ELSEIF z=5 CC=VALC$
  960 UNTIL z=5 OR (C>0ANDC<18):ENDPROC
  970 DEFPROCdemand
  980 K=1000:PROCclg
  990 FORJ=1TO12:MOVE425,K:GCOL0,0:PRINT
J:MOVE575,K:GCOL0,1:PRINTt%(J):MOVE700,K
:GCOL0,0:PRINTJ+12:MOVE925,K:GCOL0,1:PRI
NTt%(J+12):K=K-34:NEXT:GCOL0,0
 1000 PROCt(700,K-100,"Typical demand")
 1010 VDU26:GCOL0,3:ENDPROC
 1020 DEFPROCsd:IF cp=1 ENDPROC
 1030 DE=0:cp=1:p=0:PROCclg
 1040 PROCt(700,900,"SUDDEN DEMAND OF")
 1050 DE=10+RND(75):MOVE550,800:PRINTDE"
MEGWATTS"
 1060 De(hr)=De(hr)+DE
 1070 mp(10)=mp(10)-DE
 1080 IFmp(10)-DE>-1GOTO1120
 1090 IFmp(10)<0X=ABS(mp(10)):mp(10)=0
 1100 IFmp(11)-X<0PROCt(700,700,"Not eno
ugh power"):sts=sts-st:mp(11)=0:GOTO1130
 1110 mp(11)=mp(11)-X
 1120 sts=sts+st:PROCt(700,700,"Power av
ailable")
 1130 VDU26:PROCcl(150,140,0,6,3):MOVE1,
140:PRINTDe(hr)
 1140 A=INKEY(400):PROCpp:ENDPROC
 1150 DEFPROCpp:K=1000:PROCclg
 1160 PROCt(670,K,"Power report"):K=K-34
:FORJ=1TO17:GCOL0,0:MOVE670,K:PRINTs$(J)
:MOVE960,K:GCOL0,1:PRINTap(J):K=K-34:NEX
T
 1170 GCOL0,0:VDU26:GCOL0,3:ENDPROC
 1180 DEFPROCpn:K=1000:PROCclg
 1190 MOVE660,K:PRINT" Stations/codes":F
ORJ=1TO17:K=K-34:MOVE660,K:GCOL0,0:PRINT
s$(J):MOVE960,K:GCOL0,1:PRINTJ:NEXT
 1200 GCOL0,0:VDU26:GCOL0,3:ENDPROC
 1210 DEFPROCactdem:K=1000:PROCclg
 1220 IF hr<13 FORJ=1TOhr:MOVE425,K:GCOL
0,0:PRINTJ:MOVE575,K:GCOL0,1:PRINTDe(J):
K=K-34:NEXT:GCOL0,0:GOTO1250
```

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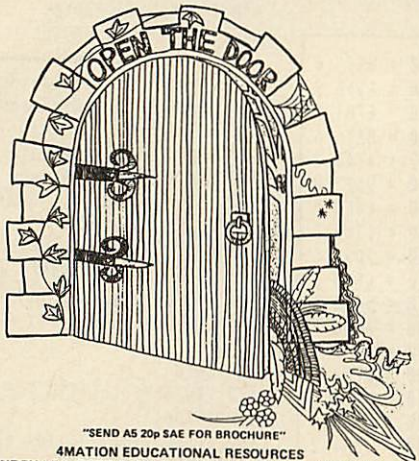

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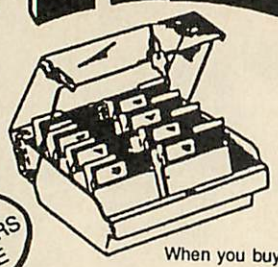

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◀ *From Page 138*

```
 1230 FORJ=1TO12:MOVE425,K:GCOL0,0:PRINT
J:MOVE575,K:GCOL0,1:PRINTDe(J):K=K-34:NE
XT:GCOL0,0
 1240 IFhr>12 K=1000:FORJ=13TOhr:MOVE700
,K:GCOL0,0:PRINTJ:MOVE925,K:GCOL0,1:PRIN
TDe(J):K=K-34:NEXT:GCOL0,0
 1250 PROCt(700,500,"Actual demand")
 1260 GCOL0,3:ENDPROC
 1270 DEFPROCstamax:K=1000:PROCclg
 1280 PROCt(670,1000,"Maximum power")
 1290 FORJ=1TO17:K=K-34:MOVE670,K
 1300 GCOL0,0:PRINTs$(J):MOVE960,K
 1310 GCOL0,1:PRINTmp(J):NEXT
 1320 VDU26:GCOL0,3:ENDPROC
 1330 DEFPROCclg:GCOL0,131
 1340 VDU24,654;390;1245;1006;:CLG
 1350 GCOL0,0:ENDPROC
 1360 DEFPROCgrid:IF GR=1 ENDPROC
 1370 PROCclg:PROCt(800,950,"NATIONAL")
 1380 PROCt(700,900,"GRID SWITCHED IN")
 1390 PROCt(700,800,"Demand > Supply")
 1400 PROCt(700,700,"Shortage is "):MOVE
900,700:PRINTDe(hr+1)-SU
 1410 sts=sts-INT((De(hr+1)-SU)/100)-st
 1420 PROCt(700,600,"STATUS loses "):MOV
E900,600:PRINTINT((De(hr+1)-SU)/100)+st
 1430 VDU26:GR=1:A=INKEY400:ENDPROC
 1440 DEFPROChep:PROCclg
 1450 PROCt(675,1000,"Hydro-Electricity"
)
 1460 PROCt(660,900,"You may choose to")
:PROCt(700,800,"1) Produce power"):PROCt
(700,700,"2) Pump up water")
 1470 PROCt(700,600,"Press 1 or 2")
 1480 A=GET
 1490 IF A=49 PROCprodpow
 1500 IF A=50 PROCpump
 1510 PROCclg:VDU26:GCOL0,0
 1520 PROCpp:ENDPROC
 1530 DEFPROCprodpow:PROCclg
 1540 PROCenter:FOR M=10 TO 11
 1550 IFC=M AND mp(M)<=0:PROCclg:PROCt(8
00,900,"NO POWER"):PROCt(800,800,"AVAILA
BLE"):GCOL0,3:VDU26:A=INKEY400:ENDPROC
 1560 NEXT
 1570 IF C<>10 AND C<>11 PROCt(660,650,"
NOT PUMP STORAGE"):A=INKEY200:ENDPROC
 1580 IF C=10 AND pw=1 OR pp=1 PROCnote:
ENDPROC
 1590 IF C=11 AND pw1=1 OR ppp=1 PROCnot
e:ENDPROC
 1600 GCOL0,0:PROCmove
 1610 PROCt(660,650,"Max. power is "):MO
VE930,650:PRINTmp(C)
 1620 PROCt(660,600,"Enter power needed"
)
 1630 MOVE660,550:INPUT ap(C)
 1640 IF ap(C)>mp(C) ap(C)=mp(C):sts=sts
-st:PROCt(660,500,"Not enough water"):A=
INKEY500
 1650 IF C=10 pw=1 ELSE pw1=1
 1660 GCOL0,1:PROCmove:VDU26:PROCsup
 1670 GCOL0,3:ENDPROC
 1680 DEFPROCpump:PROCenter
 1690 IF C<>10 AND C<>11 ENDPROC
 1700 IF C=10 AND pp=1 OR pw=1 PROCnote:
ENDPROC
 1710 IF C=11 AND ppp=1 OR pw1=1 PROCnot
e:ENDPROC
 1720 IF C=10 pp=1 ELSE ppp=1
 1730 IF C=10 AND mp(10)=1725 PROCfu:END
PROC
 1740 IF C=11 AND mp(11)=360 PROCfu:ENDP
ROC
 1750 GCOL0,0:PROCmove:ap(C)=0
 1760 PROCt(700,550,"Enter amount to"):P
ROCt(700,500,"pump up")
 1770 MOVE700,450:INPUT w1
 1780 IF C=10 AND w1>1725 w1=1725
 1790 IF C=11 AND w1>360 w1=360
 1800 mp(C)=mp(C)+w1:w=w+w1+INT(w1/5)
 1810 IF C=10 AND mp(10)>1725 mp(10)=172
5:sts=sts-st
 1820 IF C=11 AND mp(11)>360 mp(11)=360:
sts=sts-st
 1830 PROCsup:ENDPROC
 1840 DEFPROCt(x,y,A$):GCOL0,1:MOVEx,y
 1850 PRINTA$:GCOL0,0:ENDPROC
 1860 DEFPROCnote
 1870 PROCclg:PROCt(700,700,"ONLY ONE CH
OICE")
 1880 PROCt(700,600,"PER HOUR"):A=INKEY(
300)
 1890 PROCclg:VDU26:GCOL0,3
 1900 sts=sts-st:ENDPROC
 1910 DEFPROCenter:REPEAT
 1920 PROCclg:PROCt(700,990,"ENTER")
 1930 PROCt(700,900,"10 FOR DINORWIG")
 1940 PROCt(700,800,"11 FOR FFESTINIOG")
 1950 INPUTC:UNTIL C=10 OR C=11:ENDPROC
 1960 DEFPROCsup:SU=0
 1970 FOR I%=1 TO 17:SU=SU+ap(I%):NEXT
 1980 IF w>0 SU=SU-w
 1990 VDU26:PROCcl(150,260,0,6,3)
 2000 MOVE1,260:PRINTSU:ENDPROC
 2010 DEFPROCmove:MOVEp1%(C),p2%(C)
 2020 IF C<9 VDU225:ELSEIF C<15 VDU226:E
LSE VDU227
 2030 ENDPROC
 2040 DEFPROCfu:PROCclg
 2050 PROCt(700,900,"RESERVOIR FULL"):PR
OCt(725,800,"MAX. HEP READY")
 2060 A=INKEY200:PROCclg:VDU26:ENDPROC
 2070 DEFPROCend
 2080 DEFPROCtime
 2090 @%=&20209:GCOL0,0
 2100 PROCcl(1020,140,0,4,3)
 2110 MOVE 880,140:PRINT hr
 2120 @%=9:GCOL0,3:ENDPROC
 2130 DEFPROChelp:K=1000:PROCclg
 2140 PROCt(700,K,"Help screen")
 2150 FOR J%=1 TO 8:K=K-68:MOVE670,K
 2160 PRINTh$(J%):NEXT:VDU26:ENDPROC
 2170 DEFPROCquit:PROCclg
 2180 PROCt(700,900,"Well done!")
 2190 IF sts>99 PROCt(700,800,"A good ef
fort.")
 2200 IF sts>79 AND sts<100 PROCt(700,80
0,"Plan carefully"):PROCt(700,700,"next
time.")
 2210 IF sts<80 PROCt(700,800,"Redundanc
y looms!")
 2220 ENDPROC
 2230 DEFPROCreloc(Q%):P%=PAGE:*TAPE
 2240 L%=TOP-P%:IF P%<=Q% THEN ENDPROC
 2270 FORM%=0 TO L%-1 STEP4:Q%!M%=P%!M%
 2280 SOUND&11,-4,255*M%/L%,1:NEXT
 2290 PAGE=Q%:?&13=?&13-(P%-Q%)DIV256
 2300 RUN
```

This listing is included in this month's tape & disc offer. See order form on Page 151.

```
 10 =    0 0
 20 =    0 0
 30 =    0 0
 40 = 271F F
 50 = 7883 3
 60 = 753A 5
 70 = CDD4 2
 80 = B9FA 7
 90 = EA06 9
100 = 1475 3
110 = F388 5
120 = B6DC A
130 = 8760 0
140 = DFE3 B
150 = 719C 2
160 = A76B 2
170 = B32F E
180 = 3E28 E
190 = F0D3 2
200 = AC49 A
210 = D405 E
220 = 4CB7 0
230 = 1489 6
240 = 987F D
250 = F49B E
260 = E7DB 1
270 = A155 D
280 = 2BA1 6
290 = 2C83 2
300 = C903 4
310 =  6C8 E
320 = 55B3 1
330 = 58E7 3
340 = C490 4
350 = F7CF B
360 = 1937 3
370 = 1696 6
380 = F1A3 0
390 = 74B6 A
400 = 855D 3
410 = 4EBC 7
420 = 5F93 E
430 = 48FF 5
440 = 1E89 9
450 = 812B F
460 = E906 A
470 = B5CC D
480 = DCCC 7
490 = CCF0 F
500 = 27C5 2
510 = 6B93 F
520 = 7A63 2
530 = 4EB3 F
540 = CCD1 3
550 = F919 5
560 = 4A85 2
570 = A82F 4
580 = A21E E
590 = 1EA4 7
600 = D50F C
610 = E497 F
620 = B7DE D
630 = B962 4
640 = 882B E
650 =  F83 3
660 = 38E8 4
670 = 30C7 6
680 = F510 7
690 = B79A E
700 = 8A6A 4
710 = EE9E F
720 = 221F 0
730 = FA38 9
740 = DD38 6
750 = 8E4E A
760 = ABF4 F
770 = 8065 E
780 = 283E E
790 =  22E 7
800 = 8715 7
810 = 283E 9
820 = 8E4E 5
830 = 3262 6
840 = EEFE 9
850 = F367 F
860 = ED0F D
870 = DEBF 8
880 = E239 2
890 = B1FD D
900 = 62B0 1
910 = 715F 6
920 = A552 C
930 = 8EEF C
940 = 2C83 0
950 = AB6C 1
960 = EDE3 D
970 = 84C0 F
980 = 3CA5 A
990 = 672E 0
1000 = C674 1
1010 = 4ECC A
1020 = FDC1 2
1030 = 5C45 E
1040 = C85F 2
1050 = 8230 7
1060 = 68FB 2
1070 = FA6A 1
1080 = C956 D
1090 = C346 7
1100 = FC18 D
1110 = 101F 0
1120 = F852 8
1130 = 76B4 0
1140 = 5F60 5
1150 = 17E0 1
1160 = 340B 5
1170 = A785 E
1180 = 8565 1
1190 = BEC1 3
1200 = A785 2
1210 = F7D3 7
1220 = F6A4 7
1230 = 65C4 0
1240 = A21F 9
1250 =  B8D D
1260 = E9EF 0
1270 = B05A 6
1280 = E37A A
1290 = 7559 0
1300 = 7934 8
1310 = 5082 4
1320 = 4ECC 5
1330 = 66D7 0
1340 = 6DB5 7
1350 = B0BF 3
1360 = 83BF F
1370 = 8BBF F
1380 = 5F8F 8
1390 = 993B 4
1400 = 6E2D 6
1410 = DD7D 0
1420 = C646 F
1430 = 53BA 5
1440 = EC96 B
1450 = C6C5 F
1460 = 1D3D 0
1470 = 5BF1 8
1480 = BC1B 3
1490 = 7E88 3
1500 = 6740 E
1510 = D2B2 7
1520 = E6F9 3
1530 = C374 5
1540 =  912 2
1550 = 8741 7
1560 = 2C83 2
1570 = D952 E
1580 = 9AE6 9
1590 = E406 F
1600 = 8065 0
1610 = D8C7 0
1620 = 1E33 0
1630 = F2BD C
1640 = 3953 0
1650 = C9E2 3
1660 = CBF4 A
1670 = E9EF 8
1680 = F52C 7
1690 = 42F0 A
1700 = 438E D
1710 = E7A3 6
1720 = 9BEF E
1730 = 7284 0
1740 = 69FE 4
1750 =  C6F E
1760 = F2D8 0
1770 = E160 5
1780 = 8C61 3
1790 = 1A78 4
1800 = 337E E
1810 = B919 1
1820 = F844 4
1830 = C8C1 5
1840 = 3778 A
1850 = 8E73 5
1860 = 256E D
1870 = 81DA 0
1880 = E88B 4
1890 = E2D1 6
1900 = EAD9 5
1910 = A810 7
1920 = 7588 8
1930 = A179 A
1940 = 2150 1
1950 =  9A3 5
1960 = CCAD 6
1970 = 2367 7
1980 = E69D 9
1990 = 2CA8 B
2000 = 3BBE 7
2010 = A0B3 2
2020 = 9E2C 4
2030 = ED0F C
2040 = 9377 7
2050 = CBCA 9
2060 = 59EB F
2070 = 1021 0
2080 = 5D29 4
2090 = 78AA 0
2100 = 6D28 0
2110 = 35AF 4
2120 = 4960 6
2130 = 7402 9
2140 = D413 9
2150 = BEED 8
2160 = B8FD 3
2170 = 9D04 5
2180 = A0FB 7
2190 = 2A3A F
2200 = 73F0 7
2210 = 7E9F A
2220 = ED0F 9
2230 = 87A1 B
2240 = F82A F
2270 = 505A E
2280 = 7F10 1
2290 = A506 A
2300 = 7E36 4
```

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Wider audience for quizzes

I WORK in a pathology department and one of my teaching duties is to develop a program of practical demonstrations. About five years ago a colleague wrote a program for the Sinclair Spectrum which allowed us to present simple quiz programs to our students during these practical demonstration periods.

Wishing to expand this system of computer assisted learning, I bought the monthly Micro User *disc for the program Any Questions — September 1986 — and have found it extremely valuable.*

We have incorporated a menu which lists on the screen a series of quizzes covering a whole term's work in the subject.

The students are enthusiastic users and we find that it stimulates a lot of useful discussion and interaction between students and teaching staff. So much for the myth that micros have a dehumanising factor in education.

The reason I am now writing to you, apart from expressing my appreciation, is twofold:

● *Do you think that our material might be of interest to anyone else, and if so, could you make any suggestions as to how we might publish it?*

● *Could you give us any help in making further improvements to the program?*

What we particularly want to do is to incorporate the system for analysing the scores in a way which is appropriate to our needs.

We have no wish to monitor individual students' performances, since we think that this would discourage them form using the system for fear that we were keeping tabs on them.

It would, however, be a very useful education tool for us if we were able to analyse the results over a period of several weeks use so that we could identify whether the students were having diffculty with any particular questions, and so decide where our teaching might be improved.

I would welcome your suggestions on both these questions and look forward to your reply. — **John David Simnett, University of Newcastle Upon Tyne, Department of Pathology, Royal Victoria Infirmary.**

● Any Questions has proved to be a consistently popular program over the years and has been used for a variety of subjects.

Probably the best way to publish this sort of material is for authors to write in to us at *The Micro User* and let us know what they got. We'll then publish their addresses in full so that anyone interested can contact them.

Alternatively they can let people know about their work on MicroLink's bulletin board.

We don't know of anyone who's made the statistical alterations to the package you suggest. Have any of our readers done so?

Win a tenner

● **Want to write to The Micro User? The address is: Letters, The Micro User, Europa House, Adlington Park, Adlington, Macclesfield SK10 4NP.**

Writers of the most interesting letters receive a £10 prize.

Fixing the news

DO you have a fix for the Ceefax News program published in the October 1987 issue — to enable it to work with the Morley Teletext adapter with the ATS rom? — **Michael Nyman, Erdington, Birmingham.**

● *Ceefax Telesoftware organiser Jeremy Brayshaw replies:* The BBC Microcomputer System adapter has the facility to allow simultaneous capture of up to 20 Ceefax pages.

This feature is incorporated in the News program to capture the 15 pages carrying the stories plus the index page — 102 — from which it calculates the appropriate story headline.

The Morley adapter is so designed that this feature cannot be implemented. The modifications, therefore, eliminate the need for more than one page to be searched for at a time, but this causes minor problems in two areas:

● By not receiving all the page in a single cycle the program runs slightly slower.

● Because the Ceefax news pages are updated regularly, any time delay between receiving the news story and receiving its appropriate headline from the index page could result in the wrong details being given to the title. To prevent this, the

Turn to Page 144 ▶

£10 **Prize letter**

Unknown quantity

I HAVE typed in the program Environment from the November 1987 issue of The Micro User *and, to my surprise, after running it the micro told me that this machine was unknown to it.*

I've read a number of books about the Master — some of them I hardly understand — and I believe I've found the reason for this unexpected answer. Line 320 reads:

```
320 IF C%=252 ="BBC Master"
```

According to the Reference Manual, Part 2, page L.2.32 INKEY 252 refers to a German issue of the Master and therefore the computer came up with the surprising answer — Unknown. The correct statement in line 320 should read C%=253.

I have added some more lines to the published program to determine the version of other Acorn machines available in the market, so the following is a more complete version.

— **Heinrich Schmidt, Ranburg, Rep of South Africa.**

```
 10 REM * Environment *
 20 computer$=FNcomputer
 30 basicnum$=FNbasic
 40 filingsy$=FNfsys
 50 PRINT"Machine ="compu
ter$
 60 PRINT"Basic   ="basic
num$
 70 PRINT"Filing  ="filin
gsy$
 80 END
 90 DEF FNfsys:LOCAL A%,Y%
,S%
100 S%=USR(&FFDA)AND&F:fsy
s%=S%
110 IF S%=0 ="None"
120 IF S%=1 ="Tape 1200"
130 IF S%=2 ="Tape 300"
140 IF S%=3 ="rom"
150 IF S%=4 ="Disc"
160 IF S%=5 ="Network"
170 IF S%=6 ="Teletext"
180 IF S%=7 ="IEEE"
190 IF S%=8 ="Advanced dis
c"
200 IF S%=9 ="Advanced net
work"
210 ="Unknown"
220 DEF FNbasic:LOCAL A%,X
%,Y%
230 X%=&70:X%!0=&FFFF8015
240 A%=5:CALL &FFF1:basic%
=X%?4-48
250 =STR$(basic%)
260 DEF FNcomputer
270 LOCALC%:C%=INKEY(-256)
280 computer% =C%
290 IF C%= -1 ="BBC MOS 1.
00/1.20"
300 IF C%=  0 ="BBC MOS 0.
10"
310 IF C%=  1 ="Electron"
320 IF C%=250 ="Acorn ABC
MOS"
330 IF C%=251 ="BBC B+"
340 IF C%=252 ="German BBC"
350 IF C%=253 ="BBC Master"
360 IF C%=254 ="BBC US MOS
 1.00 or 1.1"
370 IF C%=245 ="Master Com
pact"
380 ="Unknown"
```

◀ *From Page 143*

original version grabbed all 16 pages during a single Ceefax cycle but these modifications ensure a new *headlines* page is obtained immediately after receiving the news story details. In this way, it can be (almost) guaranteed that any news page updated during the execution of this program will bear the correct headline.

Before typing in the modifications, make sure your copy of the original program has not been re-numbered then add or change the following lines:

```
175 DIM C% 30
305 FOR N%=3 TO 18
340 IF N%=3 MODE7
370 IF file%=TRUE AND N%=3
:PROCoscli("SPOOL "+fname$)
385 NEXT
800 PROCoscli("PAGE 1"+RIG
HT$("00"+STR$(N%),2))
810 *TRANSFER 3C00
820 *PAGE 102
830 *TRANSFER 3800
965 IF N%<>3 GOTO 840
910 G%=&3C00
980 PRINT"FNprinttitle(N%)
```

Delete the following lines:

```
210
260 to 290 inclusive.
320
440 to 560 inclusive.
610 to 730 inclusive.
1130
```

Users of the BBC Microcomputer System adapter should continue to use the original version, but should make the following two improvements:

Add:

```
165 *TTXON
175 DIM C% 30
```

Delete:

```
210
```

If you are using an older version of the BBC Micro – with Basic 1 – you may find it necessary to delete the REM statement lines. Basic 1's string handling capabilities are not quite as efficient as those of later versions of Basic, and a *no room* error may result.

Driver for Archimedes

IT has been brought to my attention that the Z88 printer driver, which I wrote for the April issue of The Micro User, *is also useful for Archimedes owners who wish to print out through a BBC Micro.*

Line 80 should be changed to read:

```
*FX7,4
```

before the program is run on the BBC Micro. If the Archimedes is configured to use a serial printer at 1200 baud and connected to the BBC Micro's RS423 port, anything printed by the Archimedes will appear on the BBC Micro's printer.

Using the printer server this way means that there is no need to keep changing printer leads or DIP switches. – **John Allen, London.**

Mixed up over minus

I WAS interested to read the letter from Arthur Viser in the April issue of The Micro User *– Nip the minus bug in the bud. In it he implies that in Basic:*

```
PRINT -7^2
```

should produce –49 (instead of 49) because of the order of precedence of arithemetic operators. There is no bug in Basic here, and although he is mathematically correct, his reasoning is wrong.

There are two distinct kinds of minus operator in Basic: The unary minus – placed in front of a single expression to change its sign – and the binary minus – which goes between two expression to subtract the second from the first.

These don't have the same priority: The model B User Guide page 144 and the Master Reference Manual page K.2-7 – both show that:

```
unary minus > power > bina
ry minus
```

This means that the above expression is correctly evaluated as (–7)^2, which is 49. If you're unsure about the order in which things will be evaluated, or you want to reverse the normal order, it is always best to add brackets, like:

```
PRINT -(7^2)
```

which gives –49 .

If you don't just program in Basic be especially careful, as the operator precedence rules vary from language to language. For example, this Basic program:

```
10 REM power
20 I = -7^2
30 J = -(7^2)
40 K = (-7)^2
50 PRINT I,J,K
```

prints 49 –49 49, but the equivalent in Fortran on an Archimedes:

```
PROGRAM POWERS
I = -7**2
J = -(7**2)
K = (-7)**2
PRINT *, I,J,K
```

prints –49 –49 49 because the power operator ** has a higher precedence than any kind of minus. The difference between Basic and Fortran here isn't specific just to BBC Basic or Acornsoft Fortran: For instance the above programs show the same difference when run on a Prime 9750 minicomputer. – **Colin Dean, Sidcup, Kent.**

Why Sam's so silent

I HAVE recently fitted a Cumana CS400 40/80 track 5.25in second disc drive to my Compact to transfer data files to and from my school Master 128 and BBC B, as well as for personal use. This I am doing successfully and with no difficulties, but one problem has emerged – minor for me but very serious for my young son.

Can you tell us why he cannot run commercially produced games on our Compact that are on 5.25in DFS 40/80 track discs?

*Take Superior Software's Play it Again Sam for instance. We load the 1770 Acorn DFS from the Welcome disc before trying to load the game disc in drive 1 (5.25in), but either nothing happens when we !BOOT or drive 0 (3.5in) begins to attempt to read even though we precede the !BOOT with *DR.1.*

We have no problems with the commercially produced games on 3.5in disc. For the sake of family harmony can you offer an explanation, and hopefully an answer to our problems? – **G. Winterman, Spittal, Haverfordwest, Pembs.**

● Your main problem with commercial software isn't going to be so much in the difference in drives as in the copy protection methods used. The large discs will not be expecting a Compact, and their protection software will come into effect.

Even if you've got unprotected software on 5.25in disc, it's still going to be in drive 1 as far as the micro is concerned. As soon as you boot with Shift+Break your default drive is back to drive 0 despite any previous *DRIVE command.

One way round this would be artificially to boot the disc with:

```
*EXEC :1.!BOOT
```

or, if this fails:

```
*RUN :1.!BOOT
```

It depends on the *OPT your disc was configured with whether you RUN or EXEC.

Suitable software

IN his educational review, CALL fills some education gaps, in the February issue of The Micro User, *Gabriel Jacobs was a little too ready to dismiss games software in foreign language teaching.*

A "couple of notable exceptions" which I have found to be not "awful" deserve mention. They were devised at Homerton College and are

published by Cambridge Micro Software.

Granville simulates a holiday in France and practises the structures and vocabulary needed to survive and enjoy a 5-day trip.

The two programs Quelle tête and Jeu des ménages – and the German equivalents Kopfjäger and Umziehen – describe and create a variety of faces and furnishings for the rooms of a house, respectively.

As a language teacher of some experience only recently exposed to the mixed hazards and benefits of using micros to teach the subject, I can confidently say that these are all enjoyable and valuable resources for modem language teachers in secondary schools. – ***Margaret Allen, Bassett, Southampton.***

Converted

I'VE read the Checksum Converter in the April issue. Congratulations for this beautiful idea. I did not try it because I'm a manager and haven't time. But, in my office:

- *One person did not read more than two lines before laughing.*
- *Another read it very seriously, declared "interesting, I'll have to try it", looked at my face, then at the cover date and was very ashamed.* – **P.Degoy, Paris**

Checksum success

THANK you for Steve Turnbull's Shorter Checksums program in the February 1988 issue of The Micro User. *I have already succeeded in getting two programs to run properly which were frustrating me before.*

However, I still have one problem which I hope you can help with. The checksums program runs correctly until it meets my first mistake, then no longer gives the correct cumulative digit from then on, even though the four hexadecimal digits are correct.

I have checked the program lines using the checksums and every line comes out correct. What have I done wrong? – **Bob Ridout, Haslingfield, Cambridge.**

- You haven't done anything wrong. The way the checksum works is just like life – everything's fine until you make one mistake – after that nothing makes sense.

The first four digits refer to the individual lines, while the last one is intended to help you find errors quickly.

Simply correct the line where the final digit of the checksums start to diverge and run Get it Right! again. Then you'll find your next mistake. . . and so on.

Basic views of Pinball

The Pinball program in the February Micro User *is excellent but on my 1983 BBC B with OS1.2 I had to make two amendments to get it working:*

```
140 *FX3
```

Then in line 2510 I had to change F%=OPENUP to F%=OPENIN and so on. – **D.A. Dallison, New Malden, Surrey.**

- The OPENIN/OPENUP conflict is caused by the differences between Basic I and II.

In Basic I OPENIN opened a file up for random access: You could read and write to it. However, it wasn't too well documented and the IN gave people the impression it was for input only. (After all, the command OPENOUT was for output only....). Now Basic keywords such as OPENIN are stored as one byte numbers or tokens, both to save memory and speed program execution.

To clarify things, when introducing Basic II Acorn decided to rechristen the token for the old OPENIN (&AD) as OPENUP, which described what the token did more accurately. So, OPENIN in Basic I corresponds to OPENUP in Basic II.

Then, probably because things were a little too clear, Acorn decided it would be nice to have a function that opened a file for just input. And some bright spark thought of OPENIN. So that became a new keyword of Basic II, with its own token (&8E). No Basic I equivalent exists.

The easiest way to run things is, if you've got Basic II, to use OPENUP instead of OPENIN – you won't notice the difference. And you can list and run your program on a Basic I machine fine. It's just that the token &AD will be shown as OPENIN – different word, same effect.

If you're in Basic I and encounter OPENUP, use OPENIN instead. If you encounter OPENIN leave it.

The *FX3 fix is to remedy an OS bug to do with the printer being enabled/disabled – at least so our dimming memories tell us. Do any of our readers recall more?

Writing roms

IN the February issue of The Micro User *there was a short routine to display an 8 bit binary number in decimal. Is there a quick way to convert a full four byte hexadecimal number into its decimal equivalent?*

Also, I am writing roms to use on a Master Turbo and need to know if gsread *and* gsinit *can still be used when the Tube is active.* – **Malcolm G. Pigott, Birkdale, Southport.**

- We assume that the number you want to convert is in machine code, in which case you can use an extended form of the Number Bases program in the *Library* – May 1987.

Gsinit and *gsread* cannot be used from the Tube, but if you're writing service roms they will only be executing in the I/O processor.

Lost for a word

IS it likely that Superior – or anybody else – will ever utilise the Speech! software? Games could have a procedure to check for the presence of a rom image and load in the appropriate code accordingly.

Just think of the likes of Codename: Droid speaking to you every time you pick up an item. It would be truly amazing.

So come on Superior: You sold us the utility, now use it for yourself and bring us a game with a real difference. – **I. Beckingham, Knutsford, Cheshire.**

- Superior is looking at the possibility of using Speech! with Master enhanced versions of some games.

Have any of our readers added speech to any listings from *The Micro User*? If so, we'd like to see the modifications.

On track of the sprites

CAN you please help me on a subject which has baffled me for quite a while: I am after the solution to every programmer's dream – sprites.

I have typed in programs from the April 1987 issue of The Micro User – *Hunkie Egg, and Tracking Sprites – but why do they both use different methods for accessing the sprites? The robot teasmaids seem to follow a pattern, but I cannot interpret the data.*

What I really want to know is whether there's a designer program for sprites or is there a straightforward programming routine?

I am willing to type out a six page long program – 20 even – if only you can help me. – **Philip Miller (age 14), Sheerness, Kent.**

- There are lots of ways of programming sprites. You'll find one method explained in the series about writing machine code games in *The Micro User* from January to May 1987.

The Tracking Sprites routine was part of that series, and if you read all the parts you should be able to write your own games.

£10 Prize letter

Z88 conversion problems

I AM delighted to see that you have started a Z88 column, as I have recently bought one to use with my BBC B. As a dedicated Wordwise-Plus user I am finding the conversion problems to and from Pipedream quite difficult. Do you have any suggestions?

I use Wordwise-Plus to write reports, and I find that one of the facilities lacking is the ability to auto-number section headings and subheadings, so I have written a segment program to do just that.

It searches the text for .HLn — where n *is 0 to 9 — and replaces the string with the appropriate header number. So if the current header is 2.1.3, .HL1 is replaced with 2.2. Each occurrence of .HLn increments the header number at level* n*, zeroing all higher levels. A contents page is built up in segment 9.*

The program should be placed into any segment from 0 to 8 and invoked — using Shift+fn where n *is the segment number containing the program — after saving the text, but just prior to printing.*

The program can be adapted for multi-file documents if segment 9 is not cleared at the start and it should be called immediately prior to printing each file.

The current parameters are saved and restored, so special page numbers and so on can be set up before calling the program.

— John Crouchley, Wollaton, Nottingham

● The listing on Page 67 will convert your Pipedream file into a format suitable for Wordwise-Plus or Mini Office II word processors.

```
REM WORDWISE-PLUS segment
program
REM Replace all .HLn in ma
in text with heading numbe
rs
REM Written John Crouchley
REM Place in any segment e
xcept 9.
REM Uses SEG9,A%,A$,B$
REM returns Contents in se
gment 9
REM Initialise heading num
ber
REM delete following three
 lines if multi-file use
REM is required
B$="0"
SELECT SEGMENT 9
DELETE TEXT

REM Now find all ".HL"s
SELECT TEXT
DELETE MARKERS
CURSOR TOP
REM UNTIL EOF
REPEAT
  FIND ".HL"
  IF EOT THEN GOTO NOMORE
  REM DELETE .HL
  DELETE AT 3
  REM GET HL NUMBER
  A%=ASC(GCT$)
  IF A% < ASC("0") OR A% >
 ASC ("9") THEN GOTO ERR
  A%=A% - ASC("0")
  REM DELETE THE HL NUMBER
  DELETE LEFT 1
  REM NOW TO GENERATE THE
NEXT HEADER NUMBER
  REM SELECT WORKING SPACE
 SEGMENT
  SELECT SEGMENT 9
  CURSOR TOP
  REM INSERT THE HEADER NU
MBER STRING
  TYPE B$
  REM INSERT DEFAULT LOWER
 LEVELS
  TYPE ".0.0.0.0.0.0.0.0.0
.0R"
  CURSOR TOP

  REM MUST NOW FIND A%TH.
DOT
 .FINDDOT
  IF A%=0 THEN GOTO FOUNDD
OT
  FIND "."
  IF EOT THEN GOTO ERR
  CURSOR RIGHT
  A%=A%-1
  GOTO FINDDOT
 .FOUNDDOT
  REM INSERT MARKER
  FKEY 3
  REM NOW READ THE CURRENT
 LEVEL NUMBER
  B$="0"
  REPEAT
    A%=(A%*10)+ASC(B$)-ASC
("0")
    B$=GCT$
  UNTIL B$<"0" OR B$>"9"
  IF B$<>"." THEN GOTO ERR
  REM NOW DELETE REMAINDER
 OF DEFAULTS
  CURSOR AT 39
  FKEY 3
  DELETE MARKED
  REM NOW INCREMENT SELECT
ED NUMBER
  A%=A%+1
  REM BUILD LEVEL NUMBER S
TRING
  TYPE STR$(A%)
  CURSOR TOP
  FKEY 3
  B$=GLT$
  REM DELETE THE WORK SPAC
E USED
  FKEY 3
  DELETE MARKED
  REM BACK TO THE TEXT
  SELECT TEXT
  REM INSERT THE HEADER NU
MBER
  TYPE B$

  REM NOW GET THE PAGE NUM
BER
  FKEY 3
  FKEY 3
  SAVE PARAMS "TEMP"
  PREVIEW MARKED
  A%=P%
  DELETE MARKERS
  LOAD PARAMS "TEMP"
  *DELETE TEMP

  REM SAVE THE LINE FOR CO
NTENTS PAGE
  CURSOR AT 0
  A$=GLT$
  REM INSERT LINE IN CONTE
NTS PAGE
  SELECT SEGMENT 9
  CURSOR BOTTOM
  TYPE A$
  REM INSERT PAGE NUMBER
  TYPE "GFIW"
  TYPE STR$(A%)
  TYPE "R"
  REM BACK TO THE TEXT
  SELECT TEXT
  REM UNTIL NO MORE HL STR
INGS EXIST
 .NOMORE
UNTIL EOT
SELECT SEGMENT 9
DISPLAY
END

REM Error Handling
 .ERR
  SELECT TEXT
  DISPLAY
  END

REM End of segment program
```

Keywords disappeared

I HAVE a BBC Micro with Basic 1. I have typed in the Mini-Com Graphics Compiler in the March Edition of The Micro User *and used Get it Right! to remove all my typing mistakes and I am satisfied that my version matches the one in the magazine. But the checksum reports errors in lines 400, 620 and 740. I have checked each of these lines and can find no errors.*

I hope you can enlighten me as I am very interested in computer graphics and have no other graphics system. — **A. Stoner, Milton Keynes, Buckinghamshire.**

● Unfortunately the program was written for Basic 2 but listed on a Basic 1 micro. The difference in the tokens caused some keywords to be missed and the correct lines are:

```
400 IF LEFT$(L$,1)="*" OSC
LI L$:ENDPROC
620 PROCNEW:CH%=OPENIN(F$)
:IF CH%=0 PRIN
T"No such file.":ENDPROC
740 OSCLI"SAVE "+F$+" "+ST
R$~base%+" "STR$ ~O%+" "STR
$~EX%:+" "STR$ ~EX%:ENDPROC
```

Z88 transfer

I HAVE been trying various things on the Z88 and found that in the program transfer, after execute, if I try to save the program using the same filename nothing happens.

Another oddity is that if I have a line in the BBC Micro like this:

```
CP%+0:B%=0
```

it transfers as:

```
C%PC%=0:B%PC%=0
```

What's happening? — **D.H. Griffin, Northampton.**

● For the life of us we can't tell. Unless any of our readers know differently, we're sticking with our belief that you've made a slip in entering your transfer program.

Master tip

WHEN you are constantly changing discs there can be problems in storing them so they are in easy reach.

However, on the Master series the problem has been unknowingly solved by Acorn. When two rom cartridges are fitted to the computer a disc or two will fit nicely between them. — **Ben Summers, Norwich.**

THE MICRO USER MAIL ORDER OFFERS

Turn your BBC Micro into a teletext receiver!

Join the 3.5 million households who regularly use teletext. The thousands of pages on Ceefax, Oracle and 4-Tel cover everything from programme details and up-to-the-minute news to share prices and football results.
But if you have a BBC Micro you can do much more than flash from page to page. With the Morley Teletext Adapter and a normal TV or monitor, you can:

- Store pages in memory
- Download the FREE telesoftware (updated every week)
- Use the real-time clock in your programs
- Automatically load associated pages each time you select a page from the menu – considerably speeding up access time

The Morley Teletext Adapter is simple to install – it plugs straight into the user port. The software is menu-driven with easy-to-follow instructions – it even automatically tunes itself to the required channel.

What you get

The stylish teletext unit, 16k ATS rom, 16k utilities rom (including printer dumps), two manuals and a utilities disc. An optional power supply is available.

NORMAL PRICE	SPECIAL OFFER PRICE
£127	£99.95

Note: If you use your BBC Micro's auxilliary power socket for your disc drive, or any other external device, you will need a power supply which we can provide for £9.95.

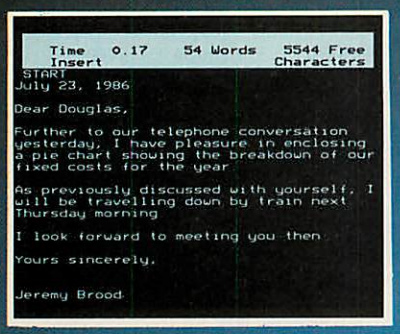
All prices include VAT and P&P.

IMPORTANT: The BBC points out that a teletext adapter, like a TV set, will not work satisfactorily without a good outside aerial. Nor will it function correctly if you experience reception problems such as ghosting.

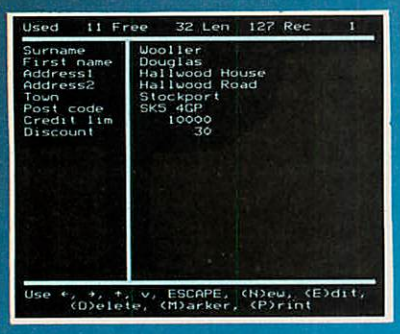
They emphasise that these problems only affect a few areas of the country. However if you have any doubts as to the quality of signal available in your area you should contact the BBC Technical Support Service on 01-927 5040.

TO ORDER PLEASE USE THE FORM ON PAGE 151

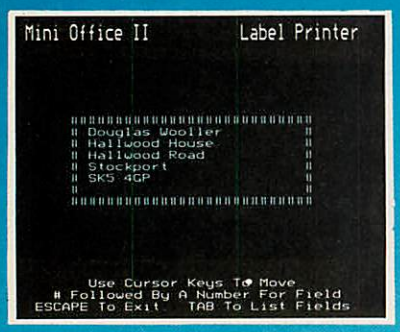
All this in just



WORD PROCESSOR
Compose a letter, set the print-out options using embedded commands or menus, use the mail merge facility to produce personalised circulars – and more!



DATABASE
Build up a versatile card index, use the flexible print out routine, do powerful multi-field sorting, perform all arithmetic functions, link with the word processor – and more!



LABEL PRINTER
Design the layout of a label with the easy-to-use editor, select label size and sheet format, read in database files, print out in any quantity – and more!

...and at a price

Mini Office II is a comprehensive integreated suite of programs setting a new standard in home and business software.

These sample screenshots illustrate just a few of the wide range of features, many of which are usually only available on software costing hundreds of pounds. Most are easily accessed by using cursor keys to move up and down a list of options and pressing Return to select.

Mini Office II takes over where the original, highly successful Mini Office left off, with numerous extra features, two additional modules, a program to convert existing Mini Office files to Mini Office II format, and a 60 page, easy to follow manual.

And it's at a price everyone can afford!

DATABASE SOFTWARE **Europa House, Adlington Park, Adlington, Macclesfield SK10 4NP.**

Now available on a power-packed rom board!

- Four 32k roms on one board packed with 128k of super fast machine code.
- Easy to install – no soldering needed.
- Split second application selection.
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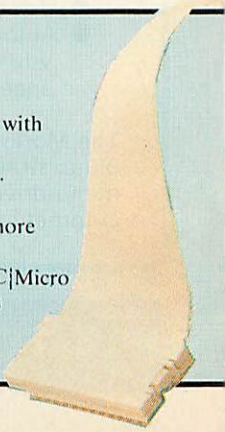
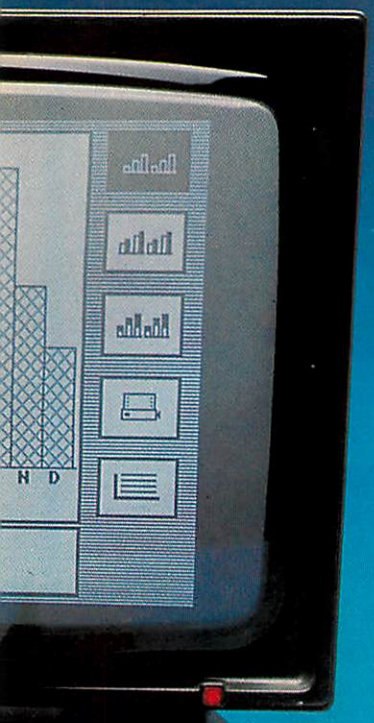


ONE package!



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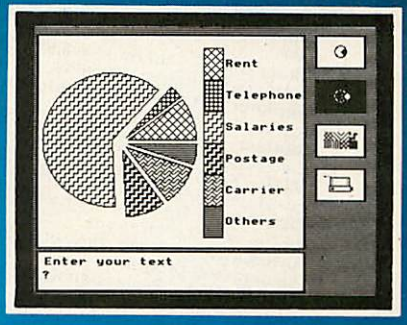
Prepare budgets or tables, total columns or rows with ease, copy formulae absolutely or relatively, view in either 40 or 80 column modes, recalculate automatically – and more!

MASTER DISC NOW AVAILABLE

GRAPHICS

Enter data directly or load data from the spreadsheet, produce pie charts, display bar charts side by side or stacked, overlay line graphs – and more!



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Using a modem you can access services such as MicroLink and book rail or theatre tickets, send electronic mail, telex and telemessages in a flash – and more!

that can't be matched!

Mini Office II

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MASTER
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COMPACT
3½" disc..... £21.95

INSTANT MINI OFFICE II
On rom for full BBC range £49.95

Turn to order form on Page 151

THE MICRO USER MAIL ORDER OFFERS

4 exciting compilations of the very best programs from the pages of *The Micro User*

TEN of the BEST!

We've brought together the most popular listings which have been published over the last year and created four packages each devoted to a particular subject area. There's entertaining games, handy utilities, clever graphics utilities and powerful ram and disc utilities – all ready for you to put to use without the need for any typing in! You can also list and adapt nearly all the programs – an excellent way to improve your programming skills.

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B+ ✓ M ✓

Disc price: £4.95

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Printer Control – Modify your printer styles easily from your wordprocessor.
Dual Screens – Give your programs the professional look with this double-screen display.
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THE MICRO USER

MAIL ORDER OFFERS

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Ten of the Best *(see page 150)*

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Starquake *(see page 131)*

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Mini Office II *(see page 148 &149)*

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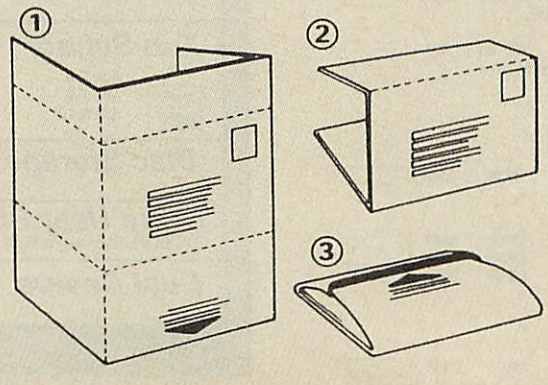

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In fact BeebDOS is probably the fastest and most powerful BBC/IBM PC file transfer method available and no cables or serial connections are required.

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BBC double density diskette formats supported are Acorn ADFS, Watford, Solidisk, OPUS DDOS and UDM. Acorn single density DFS is only supported when running BeebDOS on an IBM AT or XT286 with a 360k disk drive. Please send or phone for an information sheet

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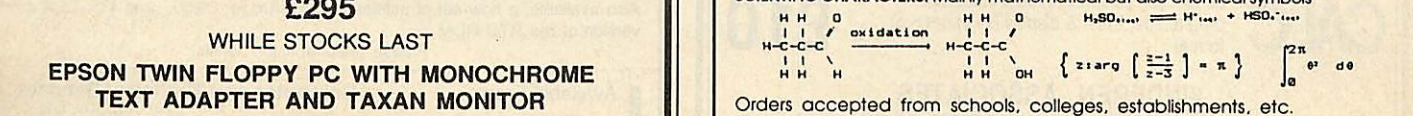

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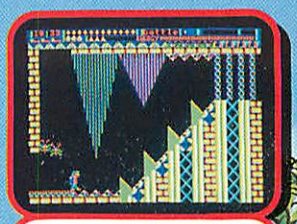

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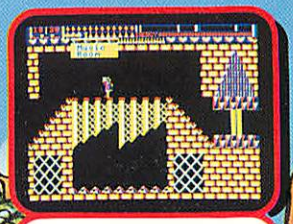

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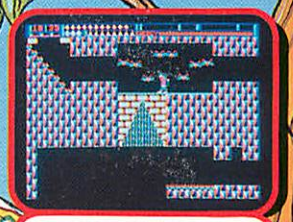

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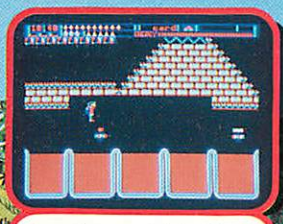

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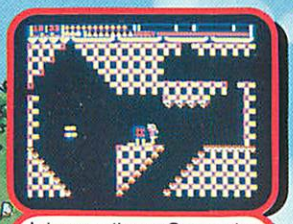

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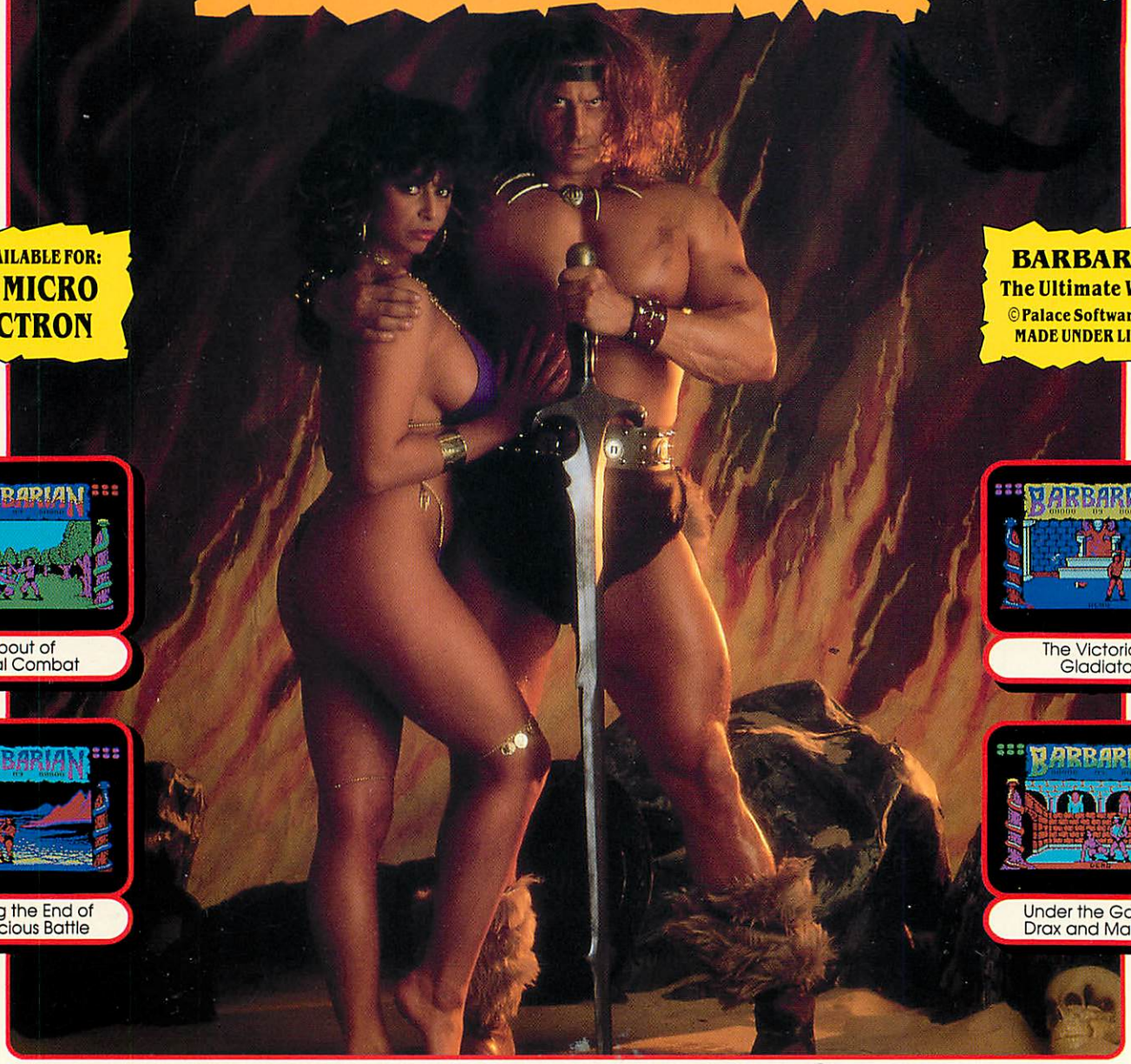

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